

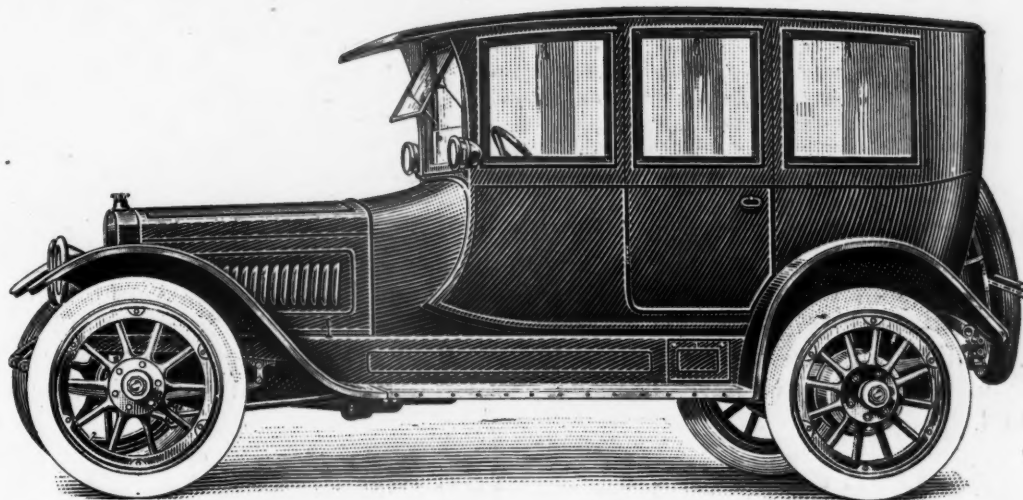
# MOTOR AGE

VOLUME XXIII

CHICAGO, JANUARY 23, 1913

NUMBER 4

## One of the Eleven Handsome LOZIER Body Types



**LOZIER**  
"LIGHT SIX"

### Model Metropolitan

Lozier dealers work with many advantages,—first, and most important, the advantage of a car of highest reputation; second, the advantage offered by two distinctly superior models and the widest range of body types. The "LIGHT SIX" Metropolitan is particularly attractive to the owner-driver. It sells for \$4450.

The Lozier "LIGHT SIX" is clearly the sensation of the season among high-grade cars. The demand for the touring model—a *self-seller* at \$3250—has surpassed all expectations. The LOZIER "BIG SIX" continues its leadership in the \$5000 class. 1913 is bound to be a banner year for Lozier dealers.

*Your territory may still be open. Write or wire*

**LOZIER MOTOR COMPANY, Box 719, Detroit, Michigan**

# KLINE KAR

## It's Time To Wake Up, Dealers

**F O R T Y**  
**\$ 1 9 8 5**

**T**HAT'S the magic combination of five letters and five numerals which spells success and adds up the sum of satisfaction to you in this new year, which is bound to see all car sales records smashed to atoms. The **Kline Kar Forty**—with full equipment, including **electric engine starter**, dynamo electric light and four speed transmission—is within your reach at a price which makes further talk idle and useless, for you know it as a four-cylinder forty horse-power creation away beyond the average.

**F I F T Y**  
**\$ 2 5 8 5**

Another quintet of letters and figures, equally as sensational and just as sure to bring you the success for which you have so long been in quest. Let's win together. With these cars in your possession—a **four cylinder forty** at \$1985 and a **six cylinder fifty** at \$2585—both with electric starters—can there possibly be any doubt of a **BIG YEAR**. This announcement means a big flood of telegrams and letters and personal visits from agents everywhere, however, and the rule of first come first served must be obeyed.

### Don't Forget, However, This One Thing

That when you sign a Kline Kar contract you secure the selling rights to two additional cars that complete your line and give you the entree into the presence of every automobile prospect in this country—no matter what his requirements.

The **Kline Kar Model 4-30**, the four cylinder, thirty horse-power car, with the past efficient Ever-Ready automatic engine starter, is a gem of pure richness and quality. A car at \$1750, but with almost unlimited possibilities.

### THE MASTER KLINE KAR

The **Model 6-60**, six cylinder, sixty horse-power seven passenger machine, really a comfortable, cozy, convenient and beautiful home on wheels, at \$3500, with full equipment, including an **electric starter**, and all other Kline Kar features, is once and for all time the final word in motor car construction. It must be seen to be appreciated. These cars will all be at the Chicago Show.

*SOME TERRITORY STILL OPEN*

**KLINE MOTOR CAR CORPORATION**

Richmond, Va.

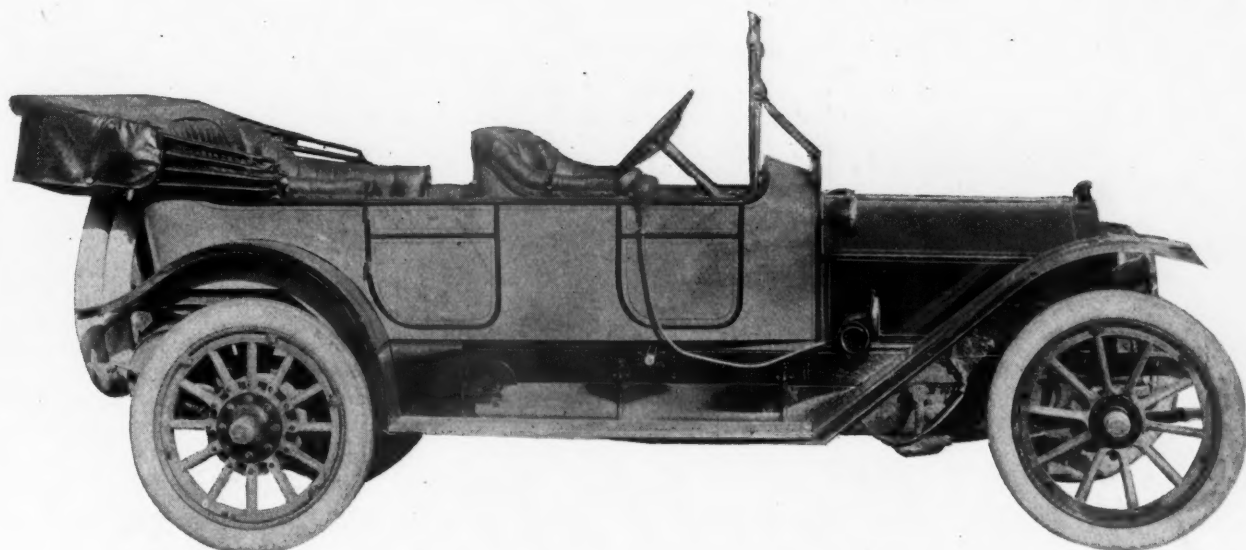
Main Office and Factory, RICHMOND, VA.

York, Pa.



Is the car you are handling up to  
your expectations? Is it a "seller"?

Have you considered the  
**\$2000 BRIGHTON SIX**



Licensed under Dyer patents 885,986 and 921,963

**WE ARE REPRESENTED AS FOLLOWS:**

PHILADELPHIA, PA...Liberty Motor Co.  
CINCINNATI, O.....Boye & Emmes  
HOUSTON, TEX.....Peters Bros.  
STAMFORD, CONN....Mechaley Auto Co.  
VANCOUVER, B. C., Maritime Motor Car Co.  
LOUISVILLE, KY.....W. P. Lothrop  
WORCESTER, MASS.....H. Parker  
AKRON, O.....A. B. Smith  
LONDON MILLS, ILL.....Z. J. Groom  
ELMIRA, N. Y....Southern Tier Motor Co.  
PROVIDENCE, R. I.....Pugh Bros.  
DENVER, COLO.....W. W. Barnett  
RICHMOND, VA.....C. W. Shields  
BINGHAMTON, N. Y.....D. V. Ashley

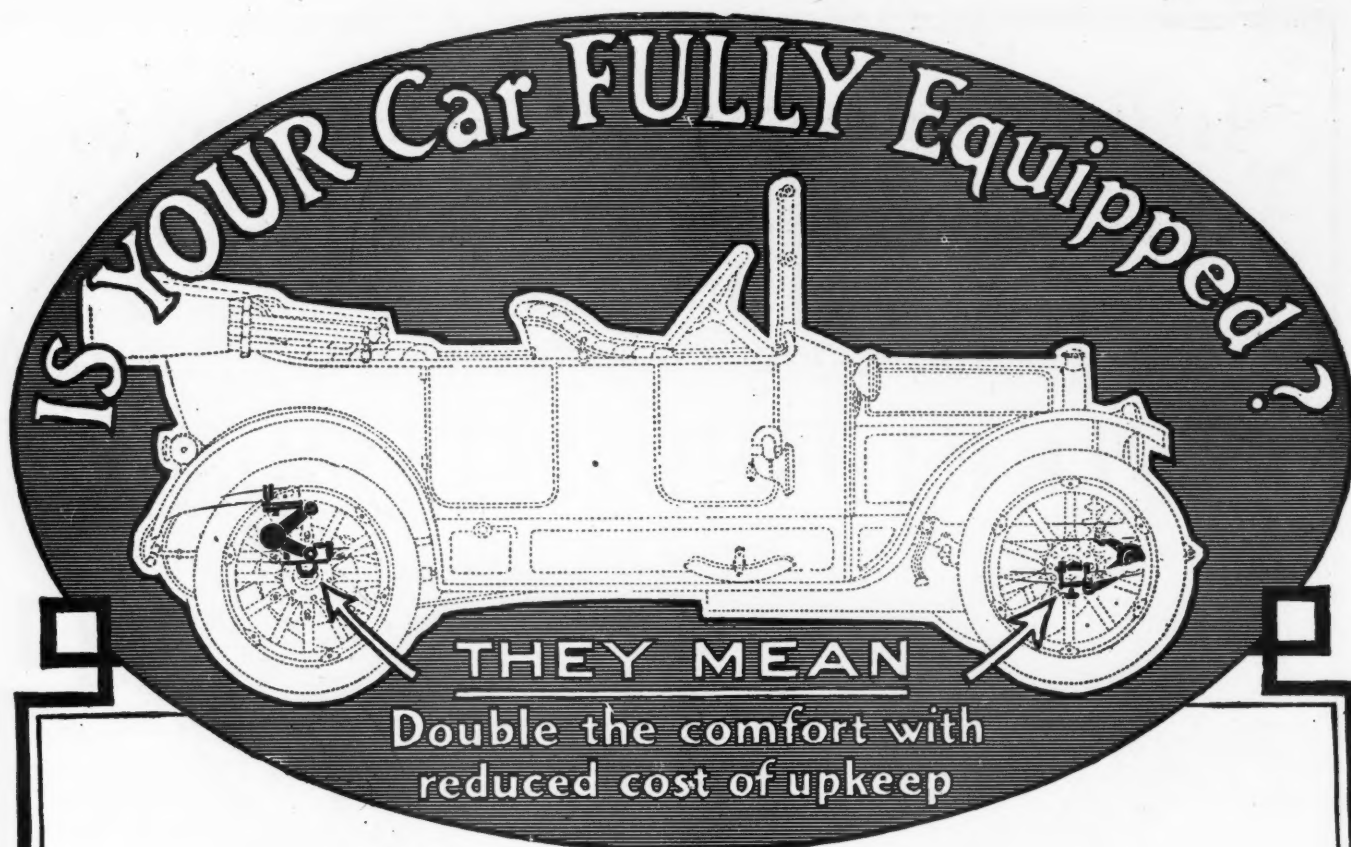
ST. LOUIS, MO.....Heindrich Auto Co.  
BLOOMSBURG, PA.....C. W. McKelvey  
UTICA, N. Y.....Clark's Garage  
BROCKTON, MASS.....Loring Motor Co.  
PUEBLO, COLO.....Ideal Motor Car Co.  
MONTREAL, CAN.....E. Major  
NEWARK.....H. Heinshimer  
GLADSTONE, MICH.....Chas. Shiung  
SCHENECTADY, N. Y.....W. E. Berning  
TRENTON, N. J.....H. J. Stout  
WASHINGTON, D. C. Warrington M. C. Co.  
SPRINGFIELD, MASS., Blue Ribbon Garage  
BUFFALO, N. Y.....Brighton Motor Co.  
SCRANTON, PA.....W. L. Perry

NEW YORK  
1620 Broadway

**Palmer & Singer Mfg. Co.**

Queens, New York City

CHICAGO  
2638 Michigan Ave.



CONSTRUCTIONALLY, the automobile has reached a stage of development which leaves little to be desired. Its builders are now concentrating their attention on equipment which has become a matter of supreme importance. Accessories which add to the comfort and luxury of motoring are being generally adopted as regular equipment. Years before accessories were even seriously considered, the

## ***Truffault-Hartford*** **SHOCK ABSORBER**

was regular equipment on most of the best known American cars, because it has always been considered more in the light of a necessity than an accessory. Today such cars as these are factory-equipped with Truffault-Hartford Shock Absorbers:

PACKARD  
ALCO  
MARMON  
STEVENS-DURYEA

NATIONAL  
MERCER  
OLDSMOBILE  
THOMAS

BENZ  
FIAT SIX  
HUDSON SIX  
CHADWICK

PREMIER  
STODDARD-DAYTON  
CORBITT  
McFARLAN SIX

COLUMBIA  
METALLURGIQUE  
BRUSH  
AMERICAN 50  
NYBERG

A car is not completely equipped if it is not Truffault-Hartford-equipped. You will realize this as soon as you ride on a set. For comfort, for economical upkeep, for real immunity from spring breakage and from excessive tire ills, the Truffault-Hartford is indispensable. Ask any of the 200,000 and more motorists now using it.

There's a set for your car and a blueprint showing how to put it on.

### **HARTFORD SUSPENSION COMPANY**

EDW. V. HARTFORD, President

Main Offices and Factory, 144 Bay Street, Jersey City, N. J.

#### BRANCHES

NEW YORK.....1700 Broadway  
NEW YORK.....212-214 West 88th St.  
JERSEY CITY.....141-143 Morgan St.

BOSTON.....319-325 Columbus Ave.  
CHICAGO.....1458 Michigan Ave.  
DETROIT.....803 Woodward Ave.

KANSAS CITY.....1524 Grand Ave.  
NEWARK.....230 Halsey St.  
PHILADELPHIA.....1437 Vine St.

INDIANAPOLIS, IND., 448-450 North Capitol Blvd.

DISTRIBUTORS: Northwestern: Reinhard Bros. Co., Inc., Minneapolis, Minn. Canadian: John Millen & Son, Montreal, Toronto, Winnipeg and Vancouver, Canada. Southern: Elyea, Austell Co., Atlanta, Ga. Pacific Coast: Chanslor & Lyon Motor Supply Co., San Francisco, Los Angeles and Fresno, Cal.; Portland, Oregon; Seattle and Spokane, Wash. Cincinnati: Coughlin & Davis, 7th and Walnut Sts., Cincinnati, O. Texas: Fisk Co. of Texas, San Antonio and Dallas, Tex.



Published by the  
CLASS JOURNAL COMPANY  
910 South Michigan Avenue  
CHICAGO ILLINOIS

Volume XXIII

JANUARY 23, 1913

No. 4

## Contents

PROGRESS PROVEN BY TRUCK SHOW.....	5
Sixty-five makes of commercial vehicles on view in New York, twelve of which are newcomers—Dumping bodies much in evidence—Trailers also seen—Left-hand drive gaining ground	
S. A. E. TESTING LABORATORY PROPOSED.....	10
Annual meeting considers several matters for betterment of industry—Motor dictionary considered—Lighting standards adopted—Howard Marmon elected president of society	
ACCESSORY MEN ELECT THEIR NEW BOARD.....	14
Tenth annual meeting of M. and A. M. held during week of pleasure car show	
DISTRICT OF COLUMBIA RETALIATES.....	15
Maryland motorists will have to pay larger registration fees because of actions of their state	
EDITORIAL—THE S. A. E.—ITS WORK AND FIELD.....	16
FRENCH SET DATES FOR GRAND PRIX RACE.....	17
Foreign road classic will be contested Saturday, July 12	
SHOW ENTHUSIASM HITS PHILADELPHIA.....	18
Quaker City takes 2 weeks to inspect 1913 motor car models	
MOTOR CARS FIGURE IN MANY MESSAGES.....	19
Governors make recommendations to various legislatures	
FOUR CONCERNS IN RECEIVERS' HANDS.....	20
Columbus Buggy Co., Randolph Motor Car Co., Searchlight Gas Co. and Michigan Magneto Co. in courts	
SEITZ TAKES OVER GRABOWSKY ASSETS.....	21
Wyandotte concern will become successor to defunct truck company	
FRENCH MOTORISTS DISCUSS ROAD TAXES.....	22
Leaders declare all money they pay should be spent on highways	
DETAILED REPORT OF S. A. E. MEETING.....	24
Papers read and discussions that followed at New York session	
LOCOMOBILE IN THREE CHASSIS FOR 1913.....	42
Description of the new line	
PEUGEOT'S THREE-POINT SUSPENSION.....	45
How principle is used on racer	
JULIAN MOTOR A PRODUCT OF REFINEMENT.....	46
Description of high-priced engine	

### DEPARTMENTS

Coming Motor Events.....	17	Realm of Commercial Car.....	38
Routes and Touring Information		From the Four Winds.....	40
Department .....	32	Development Briefs.....	48
Readers' Clearing House.....	34	Motorists' Kindergarten.....	49
Motor Car Repair Shop.....	36	Brief Business Announcements.....	50
Current Motor Patents.....	37	Among Makers and Dealers.....	52



**True  
Merit  
and Real  
Value Now  
Recognized**

The only Anti-Skid device which can be relied upon and the only one in which absolute confidence can be placed.

Proven to be a necessity and not a luxury.

## Weed Chains

*"With the Creeping Grip"*

No car is safe without them. They have stood the test of time and are regarded as the most important and profitable accessory handled and sold by automobile dealers. Victory after victory has perched on the banner of Weed Chains.

The courts, in emphatic language, after carefully considering the facts, have in numerous cases issued injunctions, restraining infringers from manufacturing or selling their infringing devices. Weed Chains are the only genuine Anti-Skid device—All others are infringements.

**Join today the army of  
"Anti-Skidders"**

Consider your own safety—Consider the safety of other road users. Take no chances.

Wise motorists are victorious in overcoming skidding accidents by the use of Weed Chains.

Cannot injure tires because they creep. Absolutely necessary on wet and greasy pavements, or on muddy, slippery roads. By our new, secret process of hardening, just adopted, the cross sections are more perfect and wear better than ever before. Packed and shipped in canvas bags.

Equip your own car with Weed Chains and insist, for your own protection, that other drivers do the same.

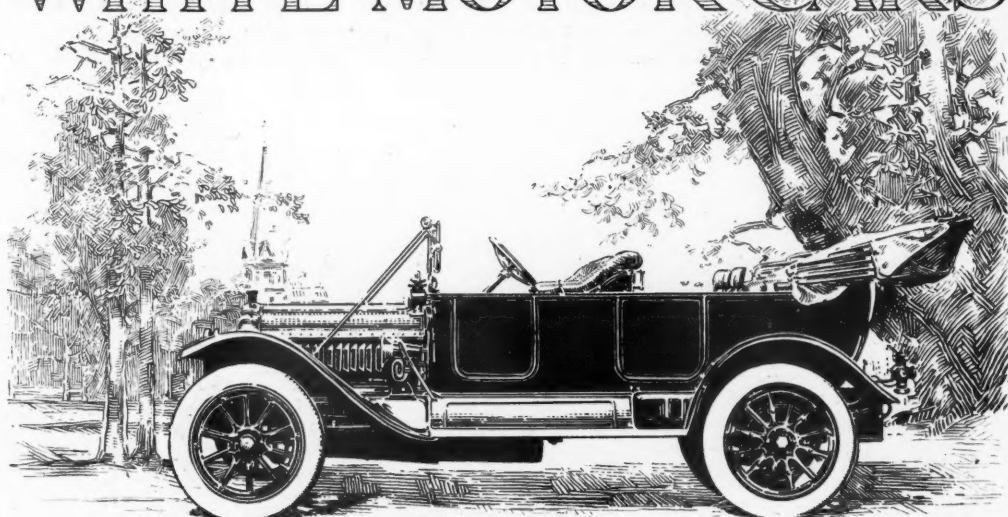
Recommended and sold  
by all reputable dealers.

**Weed Chain Tire Grip Co.**  
28 Moore St. New York City





# INCOMPARABLE WHITE MOTOR CARS



*Electrically started and lighted  
left side drive-right hand control*

**E**conomy of operation is essential in the motor car of to-day. Low fuel consumption, however was a myth until The White Company introduced to America the principles of economy embodied in the small bore, long stroke, monobloc motor.

This type of gasoline engine, now universally recognized as the most economical and desirable design, has been brought to its greatest efficiency in **WHITE CARS**

For this reason, **WHITE CARS** are really economical in operation, more so than any other cars of equal size and power.

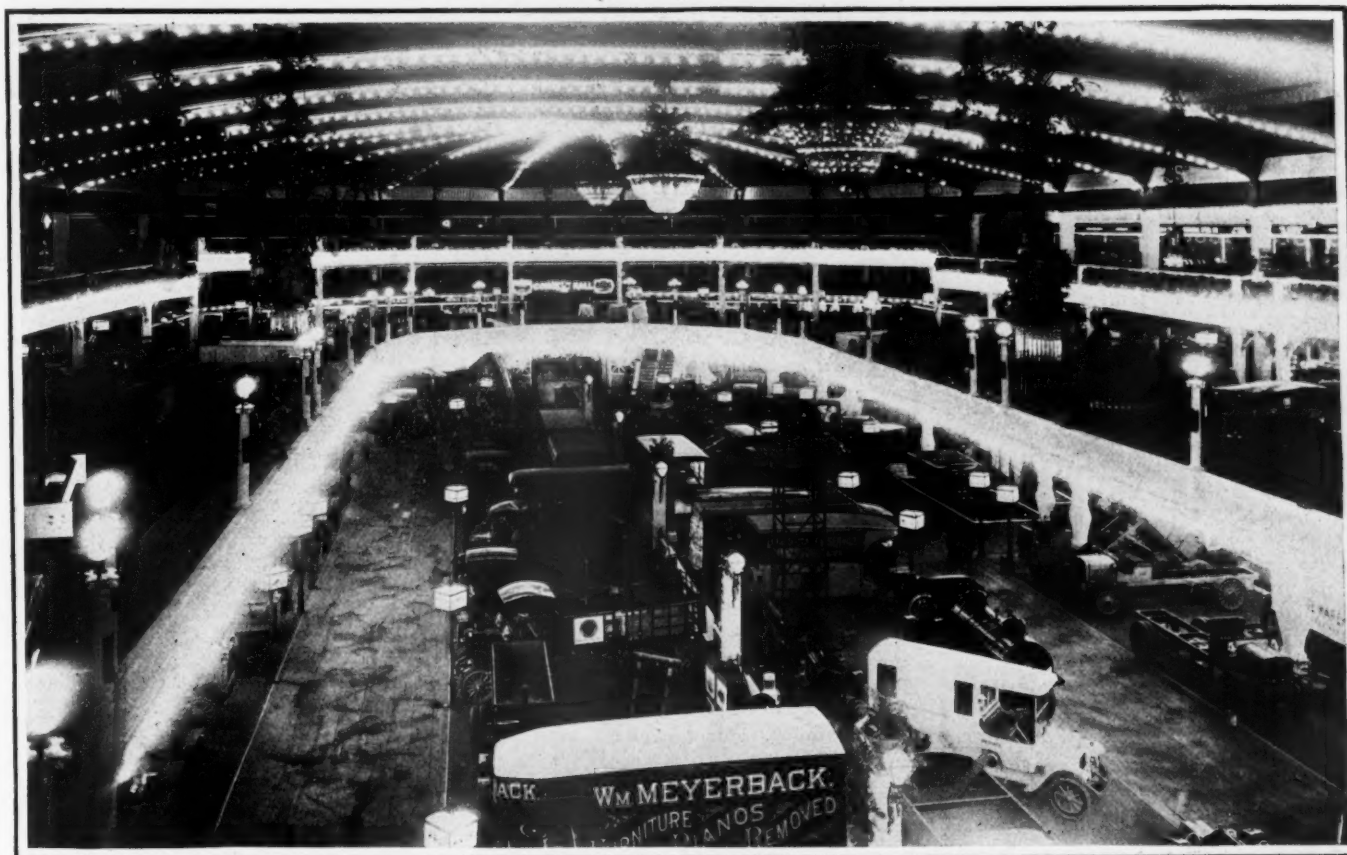
**THE WHITE**  **COMPANY**

**Cleveland**

# MOTOR AGE

## Progress Proven by Truck Show

*Sixty-Five Makes of Commercial Vehicles on View in New York, Twelve of Which Are Newcomers—Dumping Bodies Much in Evidence—Trailers Also Seen—Left-Hand Drive Gaining Ground*



AS TRUCK SHOW LOOKS INSTALLED IN MADISON SQUARE GARDEN

NEW YORK, Jan. 20—The second part of New York's thirteenth annual show opened simultaneously at the Madison Square garden and the Grand Central palace at 8 o'clock this evening with sixty-five makes of commercial vehicles on display. The immense amount of work necessary to transform the two great halls from scenes of luxury with gorgeous limousines and other splendid pleasure cars as the objects of attention into those of sterner business with massive trucks occupying the center of the stage was accomplished this year without a hitch, and at the appointed time all exhibits were in

**By L. V. Spencer**

readiness to receive those who come with the stern purpose of purchasing vehicles for business use. On the opening night it is estimated that about 10,000 persons, representing all lines of trade, visited the two shows and with the auspicious opening this largest of truck exhibitions should prove of greatest value to the industry.

The decorations in both buildings remain unchanged from last week. At the garden commercial cars appear on the ground floor and around the first balcony as well, while the only difference at the

palace is that the trucks occupy only the first floor, none replacing the pleasure cars which were exhibited on the mezzanine floor last week.

Few indeed are the makes of electric vehicles shown. These are all at the palace, the garden being devoted exclusively to displays of gasoline vehicles of all types and sizes. Six electric vehicle manufacturers are in hand and fifty-nine makers of gasoline machines. The electrics which appear are the Atlantic, Baker, Lansden, Ward, Waverley and the General Vehicle makes. The scarcity of electrics at this gathering may be ascribed to the



fact that the electric makers held a show of their own some time ago.

A rather striking feature of the exhibits at the garden is the great amount of space which some of the makers have been allotted. In several cases these large exhibits extend nearly the whole length of a side of the building. The Garford cars are spread over half of one side and all the front end of the lower floor. Alco, Autocar, White and Packard also have very large show space. This is rather in contrast to the somewhat cramped quarters allotted to several of the makers appearing at the palace, one or two of whom have room for but a single machine. The Alco exhibit consists of eight cars, the Packard of six, the White of eleven, the Garford of nine and the Autocar of a round dozen.

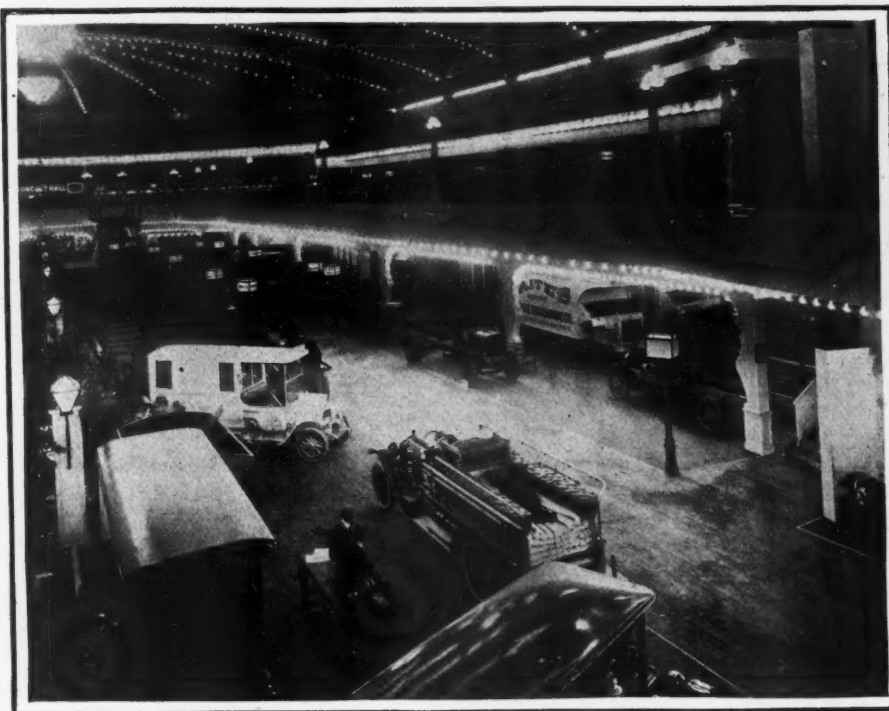
#### Dozen Newcomers Appear

Twelve makes are exhibited for the first time, among which may be found trucks of all capacities from the small delivery car to the enormous 10-ton proposition. The Studebaker Corporation may be mentioned as one of the last of the larger makers to enter the truck field. Its machines range in capacity from 1 to 6 tons and are of the shaft-driven variety. The makers of Hupmobiles have also entered the list with small delivery machines. The Stewart Corporation, which has for its moving spirits the founders of the present Lippard-Stewart concern, also is exhibiting for the first time, while the Willys utility car, named for J. N. Willys, comes as a surprise from the Gramm factory. Other new makes are the Maccar, Krebs, Hydraulic, Koehler, Standard, B. A. Gramm, Brown and Croce.

Many of the older makers in the field are exhibiting one or more new models. The tendency seems to be to fill up gaps in the lines so the maker can offer the buyer machines of capacities to fill all the needs of his business. The large depart-



*Latil-Jurgens with driver's cab tilting forward to give motor accessibility*



MAIN AISLE OF THE GARDEN, LOOKING WEST

ment store, for instance, demands light delivery trucks for city work, heavier trucks for more bulky delivery, such as furniture, and still larger sizes for transporting goods to sub-station distributing points. Motor car makers are alive to this situation and are endeavoring to meet all these needs so that when the large user places his order it may be for machines of all one make. There is a distinct advantage in this in that the repair men become acquainted with one particular design and are able to more intelligently make repairs than they would be were there several different makes and designs on which they had to work.

The Buick people appear with two new light delivery models, the Garford has added a 2-ton and a 10-ton model, General Motors has brought out three new types, while Gramm, Kissel, Kelly, Lauth-Jurgens, Mack, Mais, Packard, Speedwell, Smith, Sternberg, Studebaker, Universal, Stewart, Bessemer and Blair also may be numbered among those showing new designs.

#### French Type Displayed

Particular interest attaches to the Latil front wheeldrive truck exhibited by Walter at the garden. This machine, which is entirely a French proposition, has been imported by the Walter people, and although having nothing to do with the manufacture of the particular machine shown, it is the intention of the concern to manufacture this type of truck in this country under royalty.

The Latil machine is a good example of French commercial vehicle practice throughout. The radiator is placed back of the motor, which is of the monobloc type, while the gearset and differential



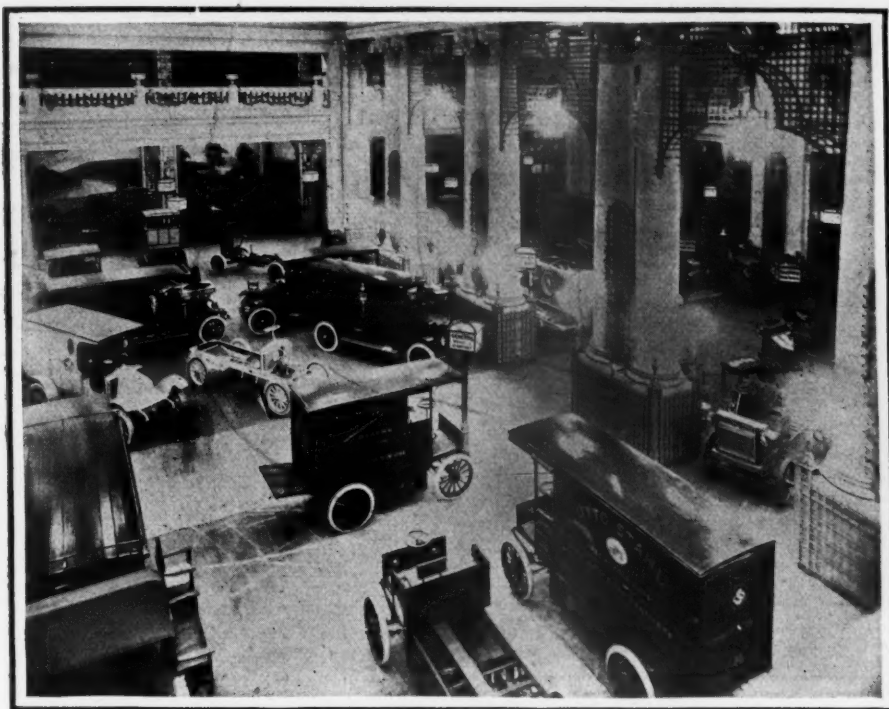
*International Harvester with two hinged shelves that give triple floor space*

are located underneath. Drive is applied to the front wheels through shafts and spur gears, the wheel gears being fastened rigidly to the front wheels. The shafts are fitted with suitable universal joints.

The tractor proposition has gained some headway within the last year. The Knox people showing a Martin machine of this type capable of hauling a maximum load of 20 tons, while the Garford also is showing a 10-ton machine. Knox is now in a position to furnish these Martin tractors for any hauling capacity between 6 and 20 tons.

Another feature of the show is the Hydraulic truck which makes use of the Manly hydraulic transmission which has been much discussed during the past year. The machine is manufactured by the American La France concern.





VIEW OF MAIN FLOOR OF GRAND CENTRAL PALACE



Front view of Garford, showing driver's cab and protection

Dumping bodies also are very much in evidence, a number of the foremost makers exhibiting them. These appear either as power-operated types or for hand manipulation. Noticeable among the power-operated type are the Packard, Alco, Locomobile, G. M. C., Mack, White, Pierce and Peerless, while Speedwell, Kissel, Universal, Garford and Knox favor the hand-operated body, judging from the exhibits.

#### Several Trailers Shown

Trailers appear in several of the exhibits at the garden where space will permit. Garford and Knox show these designs in combination with the tractors, while Alco is exhibiting a special unloading body in combination with an unloading device of the truck type. The body is mounted on rollers on the car frame and may be rolled on guides on to the trailer.

This undoubtedly is a noteworthy proposition in several lines of business where quick unloading and loading is essential, or in cases where the load must be transported by elevator to an upper floor, and it is undesirable to convey the truck itself to such upper point.

Steel wheels do not appear to be making much headway, only a few makes exhibiting machines so equipped. This seems rather unaccountable inasmuch as the steel wheel is somewhat lighter than the wood type of the same carrying capacity. There seems to be a general impression, however, that the metal wheel tends to greater vibration and has less shock-absorbing qualities. The Locomobile trucks appear with steel wheels as do the A. O. Smith and the Grand Rapids makes. White is exhibiting several models so equipped as well as those with wood wheels.

Speaking from the standpoint of cars on view, the motor under the hood type of design is favored as compared with the type which places the power plant under the seats. Four makers show designs of both varieties, while there are eleven of the underseat construction and twenty-seven having the driver's position back of the motor. Notable adherents to the latter position are the Packard, Pierce-Arrow, Peerless, White, Saurer, Kissel, Selden, Velie, Atterbury, Studebaker, Smith, Service, Stegeman and a number of others. Garford, Alco, Pope-Hartford, Buick, Locomobile, Speedwell, Lauth-Juergens, Sternberg, Blair and Sanford make use of the motor under seat design. General Motors, Knox, Mack and Universal will furnish machines of either type.

Left-hand drive has gained much ground since last year's show. It is a noteworthy fact that on the newer designs brought

out by makers who have been in this field for several years or more have this left steer with center control levers making for easy access on either side of the car, a small feature but nevertheless one which involves the time-saving element. Among the new cars or new models which show this tendency toward left drive are the 5-ton White, the Kelly 1 and 3-ton machines, Kissel 2,500-pound type, the 1.5-ton Reo, the new Mack of the same capacity, the new Universal, the Pope-Hartford's new 1.5 and 5-ton creations and a number of others. On the new 5-ton Packard right drive and control are retained, these commercial vehicles being consistently opposite in driving control from their pleasure car mates, which are now all left drive.

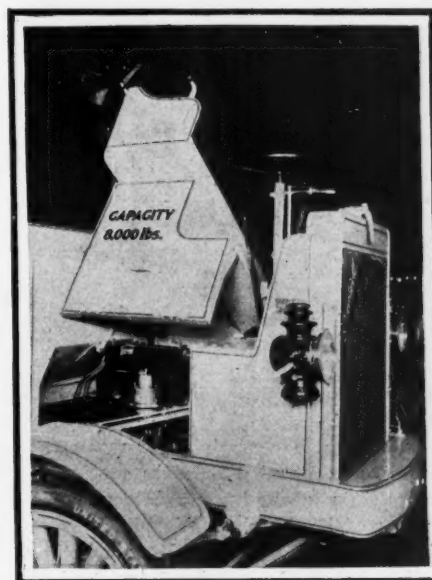
#### Radiator Behind Motor

Several machines are in evidence with hoods of the Renault type, radiators being placed at the rear of motors. Among these may be mentioned the Kelly, Walter-Latil, Lippard-Stewart, Krebs and Stewart. The Universals, though fitted with radiators at the rear of the power plants, do not use sloping hoods and should not be properly classed among the Renault types of design.

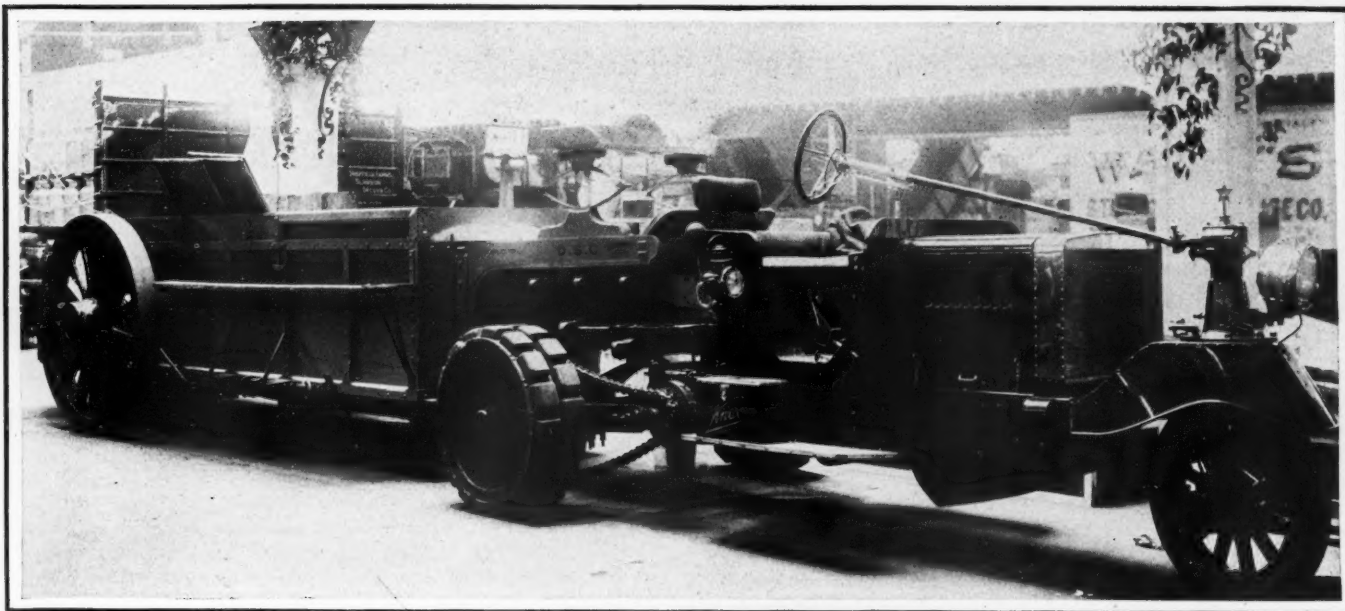
Engine starters have not gained much headway so far as commercial vehicles are concerned, their conspicuous absence on the commercial products being in striking contrast to the almost general use of some sort of cranking device on the pleasure vehicles exhibited last week.

There is a general feeling among the truck makers that the starter for commercials must come if public sentiment along this line continues as it has for some time. There are a number of exhibitors, however, who can see no use whatever for the starting device on the truck, since there is no great consideration of comfort to dictate the practice.

"If the truck driver is to be set on a pedestal and humored to such an extent that he can sit back in his leather-cush-



Speedwell truck has seat tilting sidewise to give motor accessibility



KNOX OR MARTIN TRACTOR WITH ENORMOUS TRAILER BODY BUILT BY SHADBOLT

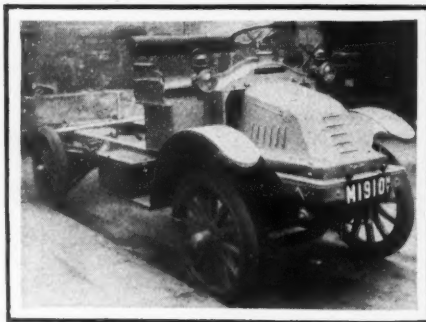
ioned seat and never have to crank his motor, he is too good to be a truck driver," said one exhibitor.

Others advanced the argument that the increased cost to the truck buyer of putting on a starter does not pay in amount of fuel saved by shutting off the motor at each stop for the interest on the increased money invested. There are still others who do not believe there is any saving at all in stopping the gasoline motor every time a short stop is made as in package delivery service. The amount of fuel needed for starting is greater than would be that used were the engine throttled to low speed and left to run at these stops. The Krebs and the Schacht are the makes conspicuous for the use of starting devices this year.

#### Placing Power Transmission

The relative positions of the various methods of power transmission to the rear wheels remain about the same as last year. There are eleven makes which have shaft drive, namely, Studebaker, Mais, Buick, Lippard-Stewart, Brown, Maccar, Rowe (optional), Hupmobile, Autocar and smaller White models. Save for the five makes which have worm drive the remainder of the fifty-nine have jackshaft and side chains. In most instances, the shaft driving through bevel gears is confined to cars of lighter capacity, the larger trucks quite generally adhering to the jackshaft construction, as heretofore.

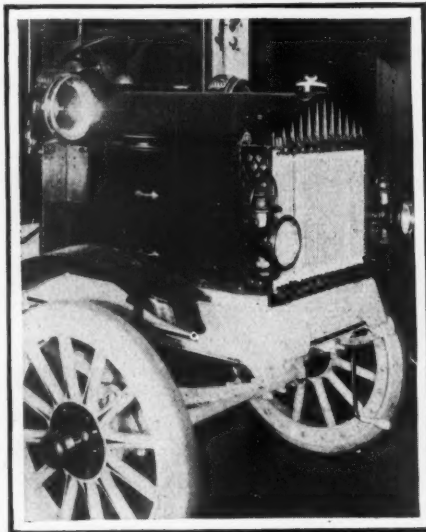
Worm drive holds its own. The Pierce models, which are exclusively 5-ton designs, have practically the same worm drive constructional details as formerly. The new Universal 1-ton job appears as a worm-driven type; four of the Blair models are so designed; two A. O. Smiths continue to carry their characteristic features; the Rowe models may be optionally supplied with worm propulsion. Most of these worms are of the overhead type, which, though said to be open to the criticism that their oiling is somewhat less effective than



*New Kelly chassis with water-cooled motor, radiator back of motor and left-hand drive*

that of the underneath worm design, nevertheless reduce the drive shaft angle and increase the road clearance.

Chain covers are still somewhat in vogue although not favored by a number of makers. The Knox and the Locomobile are conspicuous examples of very clean, sub-



*New Reo with vertical tube radiator, from which any length tube can be removed without interference with others*

stantial and easily removable practice along the lines of chain housing.

Several designs of sectional radiators have appeared. Among these are the new Reo, the Vulcan and the Universal. The latter two employ types with separate tops, and while this is also true of the Reo, it makes use of separate tubes as well. These sections are mounted vertically, one cross foot clamp holding each two tubes at top and bottom.

It is a noticeable fact that the majority of the makers are equipping their cars with sealed governors which are regulated to maximum speeds dependent upon the truck capacity as recommended by the N. A. A. M. It has been found that most makers favor these recommendations. The N. A. A. M. standard warranty plate is also much in evidence. This relates to load capacity, body weight and speed.

The National association's recommendation that the mechanism of the truck be so arranged as not to come above the level of the frame members also appears to have been fruitful, for several makers who last year had brake rods, equalizer rods, cross pieces and grease cups above the frame level have put them below. The object of this is so that any type of body may be accommodated.

#### Use of Supplementary Springs

Supplementary springs are much more prominent for larger sizes of trucks than they were last year. These take several forms, the predominating designs being either cross types which come into play only when the frame is considerably compressed, or coiled varieties fastened on the rear axle. A number of cars are fitted with rubber bumpers which are also attached to the axles.

Generally speaking the minor refinements are in evidence throughout the list of trucks shown. Many of these are not noticeable at first glance. Grease cups have been placed outside the frames and on the



springs so that the driver can have very little trouble in keeping the various parts lubricated. Interchangeable bearings are now possible with a number of makes of cars. For instance, wheels equipped with one make of bearing may be fitted with the same size bearings of another make. Brakes are generally larger and leverages have been altered to make them very positive in action. Ratchet sprag devices are noticeable on several of the heavier trucks, notably the Gramm.

Looking from the show from the standpoint of bodies exhibited, the steel construction appears to be much more in favor than a year ago. Nearly every maker, where he shows several body designs, includes one or more so constructed. Electric welding plays an important part in these types, many of them being shown with no rivets whatever.

There is a great diversity of the lines of service covered by some of the larger exhibits. With its nine cars the Garford, for instance, shows one mail wagon, an oil tank truck, a machine which is designed for express service, a brewery type, three different designs of power dumping trucks and a furniture van. There are several specialty body designs to be seen among which the Packard machine equipped with a veritable cigar store body is of special interest. The idea of this body, which is for the use of the United Cigar Stores, is that the company can now reach country towns where heretofore it has had no representation. This body has a rear entrance and counters are arranged on either side of the center passage within.

Protection for the driver has not been overlooked this year. Many cars are equipped with well designed cabs, some completely inclosed, some with stationary tops and others with folding tops. Windshields for these machines have not been lost sight of, and take several forms. In the Garford models the glass front is hinged to the top of the cab and may be swung up and fastened out of the way when desired. Other types may be quickly removed or folded sectionally. A good arrangement for seats is shown in the Knox cab, there being a partition or arm between that portion of the seat allotted to the driver and the remainder of it which is intended for his helpers. Such a seat makes it impossible for the driver's quarters to be crowded by other occupants of the seat, and is a safety feature in that it gives the driver plenty of room for manipulation of his pedals and levers.

#### PANAMA EXPOSITION SHOW CERTAIN

San Francisco, Cal., Jan. 17—Permission has been granted by the Panama-Pacific International Exposition to the National Association of Automobile Manufacturers to erect a motor transportation building on the 1915 exposition site. This structure is to house a motor show and will last the entire period of the world's fair in this city.



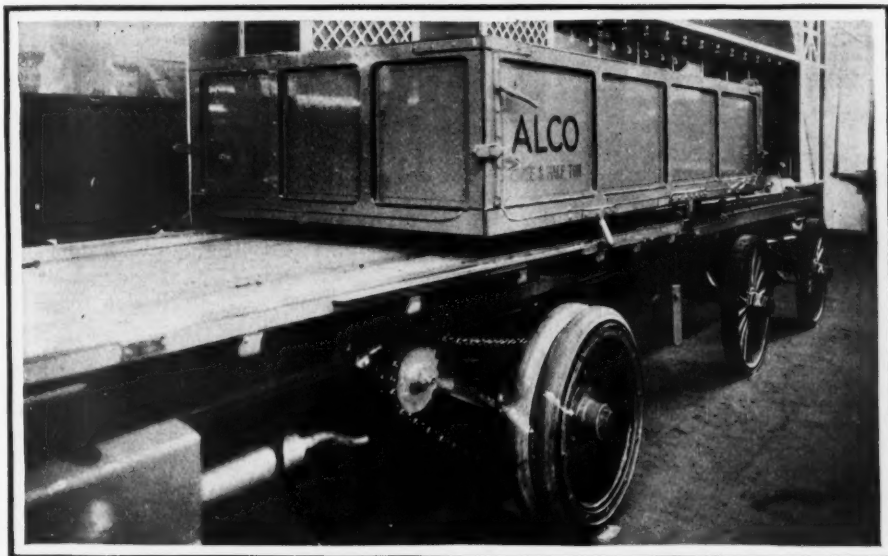
*Kissel hub oiler which eliminates necessity of removing hub cap to oil wheel bearings*

The building is designed by G. Albert Lansburgh, of this city, and it has been approved by the architectural commission. The building will be located south of the

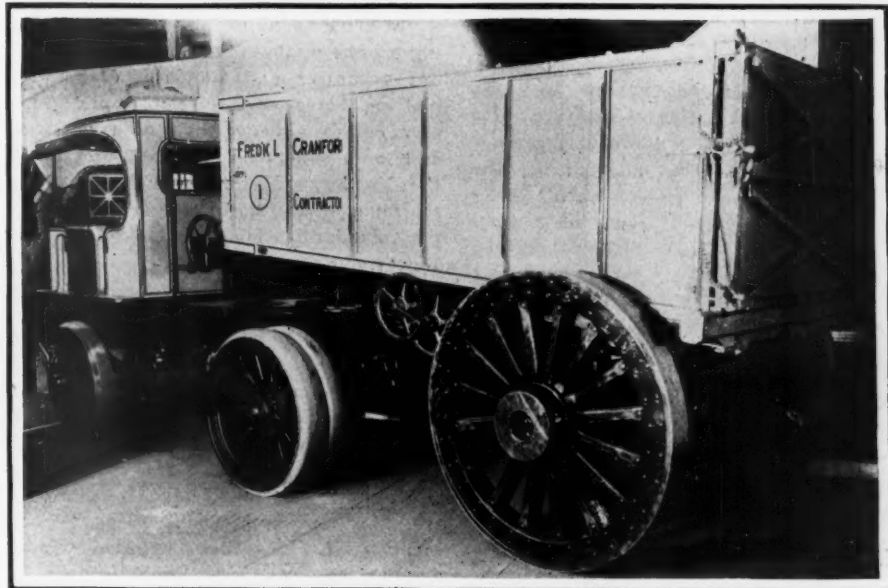
Machinery Palace, adjacent to the concession department, and it forms part of the main composition of the exposition. This structure will be one of the largest of the exposition palaces. It is approximately 275 feet front by 800 feet deep, covering somewhat over 5 acres.

The groups of statuary surmounting the attic will be allegorically carried out to typify the triumph of the motor over the elements. The main group in front will be a sort of quadriga of motor cars, typifying the conquest over the land. On the sides will be allegories of the motor boat and the aeroplane respectively typifying the victory over the sea and air. On either side of the entire length of the building there will be a frieze, 10 feet high, in bas-relief, giving the history of transportation from the early log cart up to the most modern development of motor car.

The dome which surmounts the center of the front portion of the building is 130 odd feet high.



ALCO DEMOUNTABLE BODY AND FOUR-WHEELED STAND



NEW 10-TON GARFORD TRACTOR HAULED BY 5-TON CHASSIS



# S. A. E. Testing Laboratory Proposed

## Royal Automobile Club's Example Considered Worthy of Emulation—World's Motor-ing Dictionary to be Compiled



BARNES  
S.A.E. MEETING  
NEW YORK.

Howard Marmon, new leader of the S. A. E., accepts presidential gavel

NEW YORK, Jan. 19—That the Society of Automobile Engineers will take over within the next year the duties of testing motor cars and engines which have been given up by the Automobile Club of America is considered quite probable from the action taken by the S. A. E. at its convention this week.

This was known as the winter meeting and covered the period from January 16 to 18, with headquarters at the Hotel McAlpin. Although no definite action was taken on the proposition to establish a testing laboratory, the proposition was advanced and received much favorable comment so that the chances are that next summer's meeting will see a plan



Harold Pope made an acceptable chairman

formally adopted for the establishment of a complete laboratory for comprehensive engine and car tests either at New York or Detroit.

In England, the Royal Automobile Club of Great Britain has found in such tests its chief field of activity and if the British plan

of the motor testing division of the standards committee that all car and motor makers be circularized to learn various methods of motor testing so that the best composite idea could be brought before the summer meeting. This means that in all probability the S. A. E. will compile a standard method of testing engines, specifying standard instruments and supplying standard curve sheets which are to be used in making factory tests of motor car engines. Sample curves and data sheets have been drawn up and a tentative plan of procedure in testing motors with suggestions for a standard apparatus and standard charts for plotting horsepower, efficiency and economy curves already have been prepared and were submitted by J. O. Heinze of the Northway Motor Co., who acted as chairman of the motor testing division of the standardization committee of the society.

### Lighting Standards Adopted

The society adopted standard lamps for electric lighting. All accepted electric bulbs are to be known as 7-volt lamps, and are to have an efficiency of 1.1 watts per candle at voltages between 6.5 and 7 volts. The S. A. E. standard electric headlight is to be 2.6 inches diameter size and capable of being focused in a reflector of 7½ inches or greater focal length. Side and rear lights are 1-inch diameter size. To do away with the confusion on account of the many different

sizes of storage battery it was decided by the society to circularize battery makers with the idea of arriving at two standard overall heights and widths of storage batteries, giving three standard plate sizes from which batteries of any capacity can be made by simply increasing the number of plates, which would merely change the overall length of the batteries.

Another achievement of the S. A. E. at its winter meeting was the standardization of the length, width and height of the magneto space on motors and also dimensions of the space necessary to mount the magneto.

### Policy of the S. A. E.

President H. W. Alden, opened the convention on Thursday morning at the McAlpin hotel. Speaking of the work of the society since the summer meeting, he stated that the policy has been to follow out the ideas of the late president H. Donaldson. The work of the standards committee was especially commended as representing the best efforts of the organization and carried on by the most able men of which the industry can boast.

Alden advocated the forming of local branches in all the large cities in order to stimulate interest in the society work. Movement for the endowment of the society so that it will not be dependent entirely upon dues and initiation fees was also favored.



A. L. McMurtry proved able talker on dynamometer tests

The treasurer's report showed total cash on hand and in the bank at close of year 1912 of \$11,573.10, as against \$2,230.04 at the end of the previous year. Total disbursements for 1912 were \$28,379.32, as against \$22,000 for 1911. This increase in expenditure is justified by

# Engineers Consider Taking Radical Steps

## Mid-Winter Meeting in New York Elects Howard Marmon as President and Promises Much for Immediate Future

larger membership and broader activity. The society's only indebtedness is \$4,000 in notes held by prominent members of the organization.

The membership is rapidly increasing, the curve of gain being practically a straight line. The teller's report showed 501 members taken in during the year as follows: Regular members, 190; associates, 233; juniors, 62; affiliates, 11.

Officers elected for the ensuing year were: President, Howard Marmon; vice-presidents, J. G. Perrin and Russell Huff; treasurer, Herman F. Cuntz; members of the council, H. L. Pope, E. F. Russell and J. A. Anglada.

### Monument Planned for Donaldson

The society appropriated from \$300 to \$500 for the erection of a monument in tribute to the memory of the late Henry F. Donaldson, president of the society at the time of his death. Previous to its submission to the society for action, which was unanimous, the matter had been favorably acted upon by the council and H. M. Swetland, in bringing it before the membership as a whole, stated it was desirable to have the concerted action of the society on such a matter. Mr. Donaldson's work for the society was of great benefit and he was a great man and

commenced. The third report of the broaches division was accepted without discussion as a progress report. The question of machining splined shafts with the increased tendency toward the hobbing of the spline, was taken up. This has developed new necessities in manufacture and may lead to requiring a change in the depth of the standard splines.

No report was heard from the ball and roller bearings division of the committee. Standard rod ends formed the one subject of the report of the miscellaneous division. This division has in its report standardized the length, width and height of the magneto space and recommended standard plain yoke ends on rods for connections between the carbureter and magneto control.

Electric lighting division accepted standard bulbs for lighting mentioned above and also it was decided to circularize lighting system makers with a view to fixing a standard for fuses and dimensions for fuse boxes and battery boxes. This division wanted to take up the matter of dimmers for headlights but no action was taken upon the subject.

The report of the sheet metals division giving specifications for standard manganese bronze was accepted. Makers of sheets and rods have been circularized with the idea of arriving at the general practice in this regard so as to fix standards for them.

### Report of Sheet Metals Division

In addition to recommending a specification for manganese bronze for sheets and rods, the sheet metals division presented a report of its activities along the line of standardization of sizes of sheets and rods as used in motor car construction. The report was read by division chairman T. V. Buckwalter. According to it, the division's work divides itself into two parts. First, the presentation of specifications for sheet metals and rods, and, second, the submission of specifications for the dimensions of these materials. In



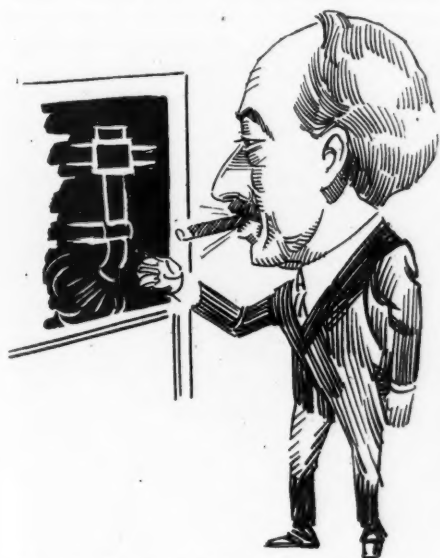
Former President Henry Souther at home at all-times on wire wheels

order to arrive at what sizes for these to recommend it is first necessary for the committee to know the preferred sizes as now employed by the manufacturers. Nearly every maker has his own special sizes and at present there is no uniformity whatever.

### Makers Asked for Data

For the purpose of ascertaining these particulars, data sheets have been circularized to every maker asking that he note thereon his preferences as to sheets and rods. It is hoped that the returns on these requested data will be complete enough so that a number of definite recommendations may be submitted at next summer's meeting and some definite action in the matter taken by the society.

The composition of the manganese bronze as submitted by the committee for



John O. Heinze explains fifty-seven varieties of engine testing

writer. It is therefore only fitting that this tribute be paid to his memory.

The average attendance at each meeting was about fifty, while 517 members and their guests were at the banquet.

After the close of the business session on Thursday the professional sessions

WHY NOT CHANGE  
THE NAME  
CARBURETER  
TO  
ATOMIZER?



Professor Hutton believes a rose by any other name would smell as sweet



*E. R. Hewitt finds instruction from exhaust end of muffler*

the consideration of the society is shown in the following table:

Copper .....	56 to 60 per cent.
Tin .....	0.50 to 1.50 per cent.
Iron .....	0.50 to 1.50 per cent.
Manganese .....	0 to 0.75 per cent.
Lead impurities...	Not to exceed 0.25 per cent.
Zinc .....	Remainder.

This applies to manganese bronze in cold rolled sheets and rods and not to cast alloy. Manganese bronze is one of the strongest of the non-ferrous alloys, having a tensile strength of from 70,000 to 72,000 pounds per square inch. In thus submitting a specification for this alloy, the report states that the committee endeavored to tie it down to chemical combination only, rather than to include both chemical and physical considerations. The report was accepted by the society as one of progress.

#### **S. A. E. Motor Dictionary**

The nomenclature division of which E. J. Stoddard is chairman has been in operation only a short time and hence has had very little opportunity to do other than make tentative plans for its line of procedure. Mr. Stoddard merely gave his views as to what was contemplated in an informal way, he having no specific report to submit at this time. The field of such a committee is great, he said, and there is much to be done. In each factory there are many words which grow up from the shops and which are not correct when ap-

plied to any particular part of the car. They are not generally received and are perhaps not understood by those in other shops.

Stoddard suggested a dictionary of terms used in the motor car industry to be printed in several languages for distribution and adoption in all countries so that the present confusion would be alleviated. For instance, there is a difference of opinion as to the correct term to apply to the transmission gears. Should they be known as the gearset or the transmission?

In fixing terms for the various components of the motor car, Mr. Stoddard pointed out that the words used should be of general application and not one which is merely satisfactory to any small body of men or to any particular art. That is, when naming parts the society should not only be governed to its own members for the correct term, but should fix a word which is satisfactory as well to any other body of engineers when used by them. Stoddard asked for the support



*George T. Briggs strong on carburetion*

of the society at large and hoped that he could be of service.

In discussing Mr. Stoddard's remarks, Howard Coffin pointed out the great advantage to the service departments if the public called parts by their proper names in ordering so that their wants could be filled promptly and so that it would eliminate the present necessity in many cases of further correspondence to determine to just what part the customer referred. This would be a saving both to owner and manufacturer. The United States patent office also has asked for the assistance of the society in arriving at correct and definite names for parts of the car, many of which at present are referred to by several different words. Mr. Coffin suggested an illustrated dictionary published in six languages. No official action was taken on the report.

#### **To Standardize Rims**

Action was taken regarding the present situation caused by the internal dissention within the rim association. This matter was discussed in connection with the meeting of the standards committee as re-



*Professor Carpenter led in discussion of long-stroke motors*

ported last week. There is a likelihood that the rim association will soon be disrupted with the result that the market will be flooded with many types of demountable and detachable rims. There are at present about five types of demountables and as many detachables. With this situation in view it is now high time for the society to step in and seek to standardize this part of the industry so that there will be one standard type of each class of rims, including the straight-side type.

#### **Resolution on Rims**

Accordingly, the following resolutions were adopted by the society at the meeting on January 17: "That there are too many pneumatic tire rims in the market; that this society believes that a much smaller number of rims will satisfy the needs of the industry and at the same time will bring about a great saving; that the committee appointed to consider and report upon this subject shall proceed at once to hold such meetings and hearings as will bring about an improvement in this situation; that a report be submitted at the earliest possible moment; that this committee shall cooperate with the National Association of Automobile Manufacturers and with the Automobile Board of Trade." The committee to consider an improvement in the rim situation for pneumatic tires



*Professor Marshall explains his accelerometer theory*



*Howard Coffin tried hard to forget his recent vacation*



was appointed and has as members representatives from the several industries involved.

A meeting of the committee was held and it was decided to hold a meeting in Cleveland, Ohio, at the earliest possible moment. At the meeting the final organization of the committee will be accomplished. Following this meeting a hearing will be given to all those interested in the situation, that is, to those having rims which they would like to have adopted as recommended by the society.

#### Investigating the Rim Situation

Those appearing at the hearing will be requested to produce the metal parts of a rim complete as furnished, including felloe band and all attachments. The weight of these parts will be carefully scrutinized and will form an important consideration in the choice of any rim. No specially prepared or machined exhibits will be considered. The rims and parts must be exactly as furnished commercially.

A complete wheel with tire also must be furnished for demonstration purpose. The standard size of all exhibits will be 36 by 4½ inches. Tools for attaching and detaching and means for inflation must also accompany the exhibit.

E. R. Hall, of the Goodyear company, discussed the situation from the standpoint of tire manufacturing, stating that all such concerns would welcome a standard rim of low cost and easy operation which would not work a hardship upon the manufacturers as far as cost was concerned. H. B. Bannister, a wheel manufacturer, stated that both the wire and the wood wheel makers would welcome the society's efforts along this line. President Alden pointed out that the committee would give a full hearing to all concerned.

Henry Souther took up the intended action at the Cleveland meeting in detail and stated that no favorites will be played. The object is to arrive at a standard type which will work for the greatest good of the greatest number. Any arrangement

which this committee makes will include competition, he said. The action of the committee was approved by the society.

Acceptance of the report of the motor testing division means that a long step is taken towards standardization of practically testing the motors. The report recommended that the manufacturers be circularized to learn the various methods of motor testing so that the best composite idea could be brought up for consideration at the summer meeting. This included the method, equipment, arrangement and specification for instruments and a standard form for data and curve sheets; also it was recommended that this also determine exactly what tests are to be considered necessary.

The report of the wheel dimensions and



W. G. Wall an expounder of national theories

fastenings for tires division of the standards committee was accepted and recommended that truck tire makers get together and decide whether or not they must demand the machining of rims which is necessitated by the greater reduction in tolerance as to rim size demanded.

#### Truck Standards Report

Report of progress was made by the truck standards division. The committee is collecting data so it can recommend six fundamental standard sizes of related parts in the motor truck, such as the size of the motor with respect to the load capacity, the size of the tires with respect to load capacity and the proportion on the load on the front or rear wheels and so on.

Christian Giv' in presenting the report of the spring division which was to have been submitted at the June sessions, stated that the work of his committee was rather to simplify the spring situation, so far as the manufacturer was concerned, than to standardize parts. The report was accepted as a progress one. The committee has before it the collection of information on the best length of spring pads or seats for overslung and underslung springs, and also the accepted distances for and aft between spring clips, for springs of different lengths.

I. V. Buckwalter in presenting the report on aluminum and copper alloys recommended an alloy for general utility made up of

Copper .....	87 to 89 per cent
Tin .....	9.5 to 10.5 per cent
Zinc .....	1.5 to 2.5 per cent

In the United States standards, the divisions are: Copper, 88 per cent; tin,

10 per cent; and zinc, 2 per cent. The recommended specifications give an alloy with reasonable working limitations, and with a tensile strength of 35,000 pounds.

The second alloy recommended as suitable for gears, worms, etc., is:

Copper .....	88 to 89 per cent
Tin .....	11 to 12 per cent
Phosphorus .....	15 to 30 per cent

Metal of this specification is extensively used in England and can be manufactured by any good metallurgist. The report was accepted.

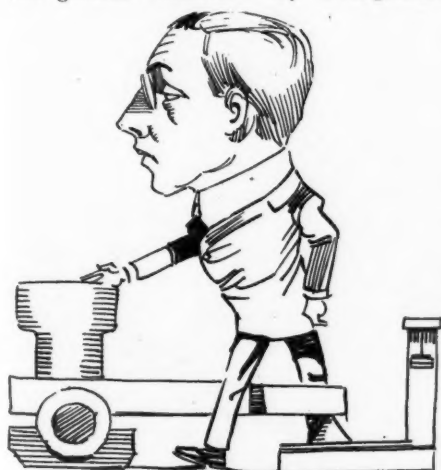
Thursday evening was devoted to commercial car papers. The first paper to be presented was comparative data on performance of motor trucks with regard to size and motor and gear ratio. It was presented by Cornelius T. Meyer. Low grade fuel for motor trucks was presented by N. B. Pope while the tendency of foreign motor truck design was outlined by Lowell C. Freeman of the Federal Motor Truck Co. B. B. Bachman, of the Autocar Co., gave comparative results on solid and pneumatic tires on light commercial vehicles. There were three topics for discussion, worm gears, motor starters for commercial vehicles, and metal wheels.

Cornelius T. Myers in his paper, proposed a formula for determining the proper size and speed of the motor and the gear reduction required for any size of truck under any set of local conditions and service. In his paper, N. B. Pope discussed the possibility, indeed, the necessity in the near future of employing a lower grade of fuel for commercial vehicles, and compared the availability of three substitutes for gasoline, kerosene, distillate and naphtha. He suggested that an educational campaign immediately be put under way and one or two successful manufacturers exploit models specifically intended for low-grade fuels. The prevalence of the worm drive was one of the chief points brought out in Lowell C. Freeman's paper on foreign tendencies. The comparison of solid and pneumatic tires on light commercial vehicles developed the fact that pneumatics, while more expensive in tire cost, lowered the maintenance cost of the truck in general very greatly.

Friday's professional session opened



E. J. Stoddard points out need of nomenclature revision



H. Chase, A. C. A.'s engine testing representative

with a paper on the "Stability of Automobile Propeller Shafts" by J. M. Thomas, which developed formulæ and curves for calculating critical speeds of shafts of different lengths and diameters at which they would fail on account of vibration. He stated that the present method requires some experience and judgment on the part of the designer if the result is to be satisfactory, and suggested a method involving less uncertainty. This was to find the diameter of the given length of shaft which, when the critical speed and vibration are taken into account will give an ample margin of safety and then to test of strength under maximum torque.

A paper on "Leaf Springs" by Leavitt J. Lane, of the Pope Mfg. Co., discussed the design and construction of pleasure car and commercial vehicle springs. S. I. Fekete of the Hudson company, presented a paper entitled "Brake Capacity Determination" in which he developed formulas for calculating brake sizes. "The Effect of Relation of Bore to Stroke in Motor Car Engines" was the subject of a paper by John Wilkinson of the Franklin company in which he stated that the general limits on the stroke bore ratio are 1 to 1 as the lower limit on account of cooling of the piston and 1 to 5 as the upper by the limits of mechanical adaptiveness.

Exhaust gas analysis was discussed by Herbert Chase and a method propounded for determining the efficiency of motor and carburetor by the percentage of carbon monoxide in the exhaust gas. George T. Briggs, of the Schebler factory, in a paper entitled "Data on Motor Testing" brought out the necessity of correct manifold design.

Friday evening was devoted to the annual society dinner which was held in the Louis XVI restaurant of the Hotel McAlpin. It was preceded by a reception at 8 o'clock. Members were addressed by President Alden, President-elect Howard Marmon, and Professor F. R. Hutton. In the course of his remarks Professor Hutton said:

"The activity of your society largely depends on the work of the sections, and the philosophy of this sectional work is not so much along the line of deep thought as to be up-to-the-minute information. Your sectional meetings call for knowledge of up-to-date requirements. The second great work of your society is the ideal of developing the standard. It is the development of this that relieves you from the influence of the sales manager and the advertising manager.

"Growth of membership should be the third ideal of your society, and I am pleased to note that your growth is as great, if not greater, than that of any of the other American engineering societies.

"The fourth ideal is that the engineer can expend less time in specialty work and

more in broad views. He should be released from the petty details and be free for better and larger work in the development of materials and properties in the heat engine, along which line the art needs its greatest development. Scientific research is needed, and what our engineers require is that exact knowledge which comes from such research. My hope and dream is that our society will have a testing laboratory established in Detroit or some other city, and that it will be conducted along board lines."

## Accessory Men Elect Their New Board

Tenth Annual Meeting Held in New York During the Show

—J. H. Foster Succeeds H. T. Dunn as President—W. Sweet Retained as Manager of the Association

NEW YORK, Jan. 18—The Motor and Accessory Manufacturers' Association was very much in evidence during the week of the pleasure car show, this being the occasion of its tenth annual meeting. At the beginning of the week meetings of the old regime were held, while Wednesday night came the usual banquet, which brought out a record-breaking attendance.

The annual meeting was held on Wednesday afternoon, at which time committee reports were read and new directors chosen. C. E. Thompson, Alfred P. Sloan, Jr., F. Hallett Lovell, Jr., and C. E. Whitney were appointed to succeed D. J. Post, H. W. Chapin, C. T. Byrne and C. E. Whitney.

On Thursday the board of directors elected the following officers: President, J. H. Foster to succeed H. T. Dunn; first vice-president, F. Hallett Lovell, Jr., to succeed J. H. Foster; C. E. Whitney continues as second vice-president; C. F. Billings succeeds C. L. Barnes as third vice-president, and L. M. Wainwright, formerly secretary, has been made treasurer. A new office of secretary and assistant treasurer has been created which will be filled by Alfred P. Sloan, Jr. William M. Sweet continues in the capacity of manager.

### KLAXON SCORES LEGAL VICTORY

New York, Jan. 18—Announcement is made by the Lovell-McConnell Mfg. Co., maker of the Klaxon horn, of the rendering of a favorable decision in its suit in the United States circuit court of appeals. Some time previous an injunction was granted the Lovell-McConnell company against the International Automobile League of Buffalo, which prohibited the latter from selling the product of the latter at less than list prices. In obedience to this injunction the league, which is a cooperative purchasing and profit-sharing organization, notified its members that hereafter Klaxon horns would be sold only at list prices. In an alleged attempt to avoid actual payment of these prices, while apparently complying with the law, it is said notice was sent out that upon receipt of the list price

The closing session of the society's meeting took place on Saturday morning when the following topics were discussed: "Magneto Couplings; With the Motor Starter, Lighting Plant and Ignition Possible in One Unit, Will the Magneto be Discarded?"; "Will the Six-Cylinder Motor Eventually Displace the Four-Cylinder for Pleasure Cars?"; "Why Has the 42-Inch Wheel Been Discarded?" The papers presented and their discussions appear on other pages of this issue. See pages 24 to 31 inclusive.

of one of these signals the league would return a horn and a check to the amount of the discount formerly allowed, payable to any charitable institution the buyer might designate. In the opinion of the court this was considered a device to enable the purchaser to get his discount by assigning the check to himself, as a charitable institution. The opinion was handed down by Judge Lacombe.

### WEED ENJOINS SIX MAKERS

New York, Jan. 20—Responsive to action taken by the Weed Tire Grip Co., six manufacturers and dealers of tire chain accessories have been enjoined against further manufacture and sale of their products. Bills of equity were filed by Duncan & Duncan, attorneys for the Weed interests, against the W. E. Pruden Hardware Co., of New York; Edwin S. Holmes, Jr., holder of a patent relating to cross-chain hooks, Randolph T. Warwick, Leon Tobiner and Charles Bauer, dealers in attachments to the Weed chain grip without license from the holders of the Parsons patent, under which the Weed company manufactures; and the Q. D. Hook Co., of Washington, D. C., manufacturer under the Holmes patent. The W. E. Pruden Hardware Co. was sued about 2 years ago for selling chain grips, and other attachments, unlicensed under the Weed patent holdings, but the suit was dropped upon its promise to discontinue the infringement. In violation of the promise, it is alleged, it has marketed goods unlawfully competitive with the Weed chain and parts. Injunctions were issued against each of these defendants.

### ROSE PATENT SUIT DROPPED

New York, Jan. 20—A decision rendered in the United States district court for the district of New Jersey by Judge Cross in the suit of the Rose Mfg. Co. vs. the E. A. Whitehouse Mfg. Co. and the Le Compte Mfg. Co. dismissed the bill of complaint with costs. The bill alleged infringement of the Rosenbluth and Hughes patents owned by the Rose company, by the de-



endants. The patents cover lamp brackets and number plates.

#### IMPORTERS WANT LOWER DUTY

Washington, D. C., Jan. 20—The ways and means committee of the house of representatives is listening to petitions from the motor industry on the tariff. The chain makers have submitted a brief asking that no reduction in the present tariff of 45 per cent ad valorem on their product be considered, while the car importers petition for a reduction from 45 to 25 per

cent ad valorem, pointing out that their imports have shrunk one-half since 1907, causing the government to lose \$1,381,634 in duties. The importers say that with a 25 per cent duty they can bring their importations up to 3,000 chassis in the next year following the reduction, which would not be serious competition for the American manufacturers with their 300,000-car output in 1913.

Accompanying the importers' brief is a most interesting table showing motor car manufacturing costs.

could obtain a District of Columbia license for \$2 and it was good as long as the licensee owned the car. The new order has been issued as a police regulation.

The district commissioners, however, can revoke the order any time they see fit. In other words, if the Maryland authorities will agree to a reciprocity plan whereby Washington licenses are recognized across the state line, as is now done in every state in the union, the order will be vacated.

#### CONTRIBUTE TO ROAD FUND

New York, Jan. 20—John North Willys, president of the Overland company, has donated the sum of \$150,000 to the fund which is being raised for the purpose of constructing a national highway from one coast to the other. This donation is to be paid in three instalments of \$50,000 each, payable during 1913, 1914 and 1915.

The Packard company has subscribed \$150,000 to transcontinental stone road fund. It has not been decided yet whether this sum will be paid all at once or in three annual installments, but contribution is subject to following three conditions:

It is to be paid only in case of sufficient funds being subscribed for construction of the entire road scheme.

Engineering work must be supervised by government engineers.

States through which road is to be laid to contribute labor. The latter condition is merely for the purpose of insuring the proper use of funds.

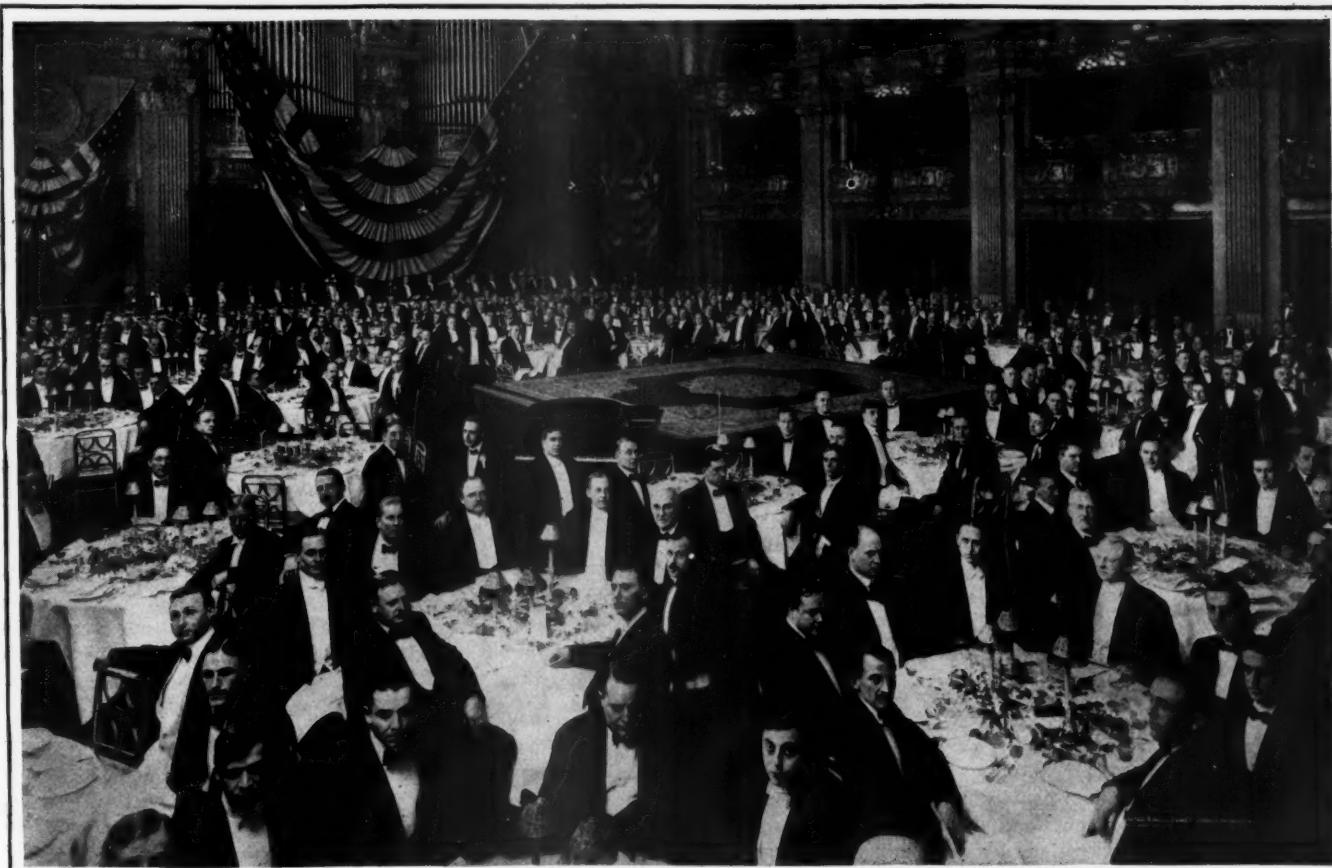
## District of Columbia Board Retaliates

### Regulation Fees for Maryland Owners to Be Same as Latter Charge, Ranging from \$5 to \$25 a Car Instead of \$2—Regulations to Become Effective February 1

WASHINGTON, D. C., Jan. 18—After having contributed more than \$50,000 to the coffers of Maryland for the privilege of using Maryland roads, motor car owners of the District of Columbia have at last been enabled to retaliate for the alleged bad treatment they have been subjected to for several years. The district commissioners have adopted new regulations, which will become effective February 1 next, compelling all Maryland motor car owners to pay a license fee to the district equivalent to the fee which they pay the state, in complete disregard of the fact that Vir-

ginia, Pennsylvania and, in fact all other states that grant reciprocity, can have the motor cars of the citizens of those states enter the District of Columbia without the payment of any license fee and despite the further fact that the district license is only \$2 and is perpetual.

In other words, Maryland motor car owners must pay the same license fees exacted of residents of the state, ranging in price from \$5 to \$25 per car per year. Maryland's refusal of reciprocity is responsible for the attitude assumed by the district authorities. Until the new regulations were issued Maryland motorists



ANNUAL BANQUET OF MOTOR AND ACCESSORY MANUFACTURERS IN NEW YORK CITY



**MOTOR AGE**  
Published Weekly by  
**THE CLASS JOURNAL COMPANY**  
910 SOUTH MICHIGAN AVENUE CHICAGO

**NEW YORK OFFICE**  
239 West 39th Street

**SUBSCRIPTION RATES**  
United States and Mexico  
\$3.00 per Year  
Other Countries including  
Canada \$5.00

Entered as Second-Class Matter September 19, 1899, at the Postoffice at Chicago, Illinois, under Act of March 3, 1879

## The S. A. E.—Its Work and Field

AT the mid-winter session of the Society of Automobile Engineers, held in New York city last week, the value of such an engineering organization to the car owner was well demonstrated by the activities of the society on practical questions that affect the operation of a car by every individual.

ENGINEERING societies are generally considered to be only for the engineer, but while the S. A. E. works primarily for the manufacturers of cars and accessories, it also works directly and indirectly for the general good of every car owner, and every truck owner. The maker realizes that a satisfied owner is his greatest asset and that the sure path to satisfaction with owners lies through a satisfactory car.

EVERY owner should welcome the movement of the society to compile a standard set of terms covering car nomenclature. At present one maker uses the term gearbox, whereas another employs the word transmission, both makers having the same part of the car in mind. This gives one example of the necessity of standardized terms for corresponding vehicle parts. Patent attorneys engaged in international business have discovered much difficulty because of a lack of uniformity in motor car nomenclature; and concerns operating service departments throughout America are experiencing equal difficulty in ordering parts due to different nomenclatures used by the different concerns. Not only is a uniform and standard form of nomenclature required in America, but such a system should be uniform with that of England, France, Germany, and other countries.

THE society is showing its practical worth to the car owner by its early activity in connection with wire wheels. By appointing a special committee to take charge of such work, the society hopes to avoid that labyrinth of trouble which the truck owner discovered himself in a year or so ago when solid rubber tires were not made interchangeable, and when changing from one make of tire to another meant purchasing new wheels. The wire wheel is coming; next year it will be in great demand, and now is the time to settle the questions of standardizing hub sizes and other parts which are susceptible of practical standardization so that the fitting of the wire wheel will not carry with it a useless expense and an unnecessary loss of time to the car owner. The value of wire wheels is recognized on all sides and the society is doing the car owner as well as the manufacturer a great good by making the fitting of such wheels as simple a matter as possible.

WHAT is needed in the sessions of the society is more wholehearted discussions by the engineers on such questions as large diameter wheels, four-cylinder vs. six-cylinder motors, unit gearbox location with motor vs. unit gearbox location with rear axle, and other topics of an equally practical nature. The layman desires information on these subjects, and it is only by participation in such discussions by our engineers representing both sides of the argument that it is possible to give the car owner the information he is seeking.

AT present many of the features of the new cars that prove the convincing part of the selling argument are dictated by the buyer. For example, this season the buyer demands a cranking motor, preferably of the electric type. This demand is country-wide. It is so urgent that the manufacturer has to heed it, and in fact a few makers who imagined they could sell their cars without starters have been compelled to make hurried attachments at the twelfth hour. Conditions of this nature are costly to the manufacturer, more or less disrupting to the industry, and very frequently unsatisfactory to the owner in service. It would have been much better had the subject of cranking motors been thoroughly discussed at the mid-summer season of the society, so that the effect of the discussion could have been scattered broadcast throughout the country and had a salutary effect on the buying demands of the public. Not only would such a discussion have made the buyer more capable of taking the same view on the subject, but it would have also made the manufacturer better prepared for the exigency which he has found himself confronted with during the last 2 months in preparation for 1913.

THERE is not any reason why the society cannot become a mold of public opinion, as well as an organization for standardizing constructions after the demand for certain construction has been created by the public. Playing such a role as this by the society would have a very desirable effect on adding stability to the buying clientele, and instead of quickly precipitated avalanches of public opinion towards one device or another, there would be a more maturely developed demand and consequently one pointing more directly towards a definite goal for the manufacturers.

IN this respect the Society of Automobile Engineers occupies a different position than that of societies for electrical engineering and mechanical engineering. With a motor car the engineer deals directly with the millions of population, whereas in the electrical industry he deals with manufacturing concerns rather than individuals. It is because of this difference that the society should approach the broad question of governing public demand. Unquestionably many of the short-lived whims of the past 3 or 4 years could have been eliminated with great saving to the manufacturer and owner had the questions been squarely met and thoroughly discussed and analyzed at an early period in their history. Rapid whimsical changes are expensive. Instead of the public creating a demand the situation should be reversed, and the manufacturer should, by broad-gauged research, settle well in advance what is correct and then supply it to the public. No better method of reaching this end can be found than in the S. A. E.

TO-DAY we are in a cart-before-the-horse regime, which is proving needlessly expensive and unsatisfactory to all parties concerned. Such a state of affairs will continue so long as our engineers fail to reach a broader basic requisites of the various component parts of the car, which up to the present have been so largely reached by a zig-zag series of investigations demanded by the public.



# French Set Dates for Grand Prix Race

PARIS, Jan. 8—Saturday, July 12, has been fixed for the French grand prix fuel consumption race to be held on the 19-mile course near Amiens. It has been decided that the course will be covered twenty-nine times, which will give an approximate total distance of 563 miles. For this distance the fuel allowance will be 40 gallons, the rules stipulating that cars shall not consume more than 1 gallon per 14.1 miles. The whole of the fuel must be on the car at the start of the race.

The exact length of the course will not be known until it has been decided how the hairpin turn at the Amiens end will be treated. It is probable that instead of taking the cars around the present bend a special semi-circular banked track will be built uniting the two parallel roads. This bend will be so designed that cars can pass from the first to the second leg of the course at high speed, and as the main grandstands will be built around the outside of the banked turn, true motordrome conditions will be secured. Probably the pits will be on the straightaway just after the banked turn.

It is probable that Mercedes cars will come into the race. The English agent of the German Mercedes company has made an entry, but this has been temporarily refused by the racing board, on the ground that only manufacturers can take part in the race. If, however, the parent company makes no objection to the agent running these cars, they will be admitted by the French club. It is also probable that one or two Turcat-Mery cars will be entered for the grand prix.

Very few of the drivers have yet been selected for the race. The Peugeot team will consist of Georges Boillot, Jules Goux and Zuccarelli. Sunbeam has decided to have two English and two French drivers. The former will be W. Lee Guinness and D. Resta, and the latter Victor Rigal and M. Caillois. Delage has selected Albert

## Foreign Road Classic Will Be Contested Saturday, July 12

Guyot as one of his drivers; the second has not yet been appointed. Two of the Schneider drivers will be Champoiseau and Croquet, who drove for this firm last year; the third man has not been selected. Arthur Duray will probably be at the wheel of the Turcat-Mery car about to be entered. Christiaens will drive the six-cylinder Excelsior. The old-time cracks, Wagner and Hemery, probably will sign on with some of the foreign firms.

It is now practically decided that the grand prix will be followed by a motor cycle and cyclecar race on the same course. The conditions for this have not yet been decided on, and no official announcement regarding the race has yet been made.

## ALCO TRUCK BREAKS RECORD

New York, Jan. 16—The Philadelphia to New York record by motor truck of 8 hours and 45 minutes was lowered by 14 minutes today when the transcontinental Alco truck bettered its own previous best mark despite muddy going, heavy rains and thick fog.

Carrying a cargo of thirty boxes of soap, consigned by its owners, Charles W. Young & Co., of Philadelphia, to Schwarzenbach, Huber & Co., a large silk manufacturing concern in West Hoboken, the big freighter made the journey in 8 hours and 31 minutes. The load transported by the truck weighed 8,247 pounds.

## INDIANAPOLIS DROPS A DAY

Indianapolis, Ind., Jan. 20—The management of the Indianapolis motor speedway has decided that there shall be but 1 day of racing at the May meet to be held at the speedway. This will be on Memorial Day—May 30—and the only event will be the 500-mile international

sweepstakes for cars of 450 cubic inches piston displacement and under.

Some time ago the management contemplated a 2 day meet, with a number of shorter events for 1 day and the 500-mile race the next. After consulting with manufacturers, it has been deemed wise to limit the meet to 1 day and one event.

The Nyberg Motor Car Co., of Anderson, has entered a Nyberg car for the race and has nominated Harry Endicott as driver. This makes three entries to date with prospects bright for a large number of additional entries before many days. It also is announced Burman will drive a Keeton six.

## WANTS UNCLE SAM TO HELP

Columbus, O., Jan. 20—Senator J. I. Hudson of the Ohio general assembly has introduced a joint resolution petitioning congress for sufficient appropriations to establish a system of national highways. He estimates that 90 per cent of travel is confined to 20 per cent of the highways and it would not be necessary for the government to improve more than 400,000 miles at this time. He says there are 2,198,645 miles of highways in the country and only 10,679 or 8.66 per cent are improved.

## ROAD BILLS FOR INDIANA

Indianapolis, Ind., Jan. 20—A large number of good roads bills have been introduced in the Indiana legislature, now in biennial session. Many of these bills resemble each other closely and the most of them will be killed in committee.

It is the intention of the majority members of the house and senate to take all of the bills introduced and from them construct a bill in accordance with promises made in the party platform. It is regarded as likely that the bill to be introduced and passed will create a state highway commission and a state highway tax and provide for an annual state license on motor vehicles.

## SHOWS

January 20-25—New York truck show; Automobile Board of Trade; Grand Central Palace and Madison Square Garden.  
January 18-25—Philadelphia pleasure car show.  
January 20-25—Lynn, Mass.  
January 21-26—Toledo, O.  
January 25-February 1—St. Johns, N. B.  
January 25-February 1—Providence, R. I.  
January 25-February 1—Montreal, Canada.  
January 27-February 1—Rochester, N. Y.  
January 27-February 1—Scranton, Pa.  
January 27-February 1—Detroit.  
January 27-February 1—Buffalo, N. Y.  
January 27-February 1—Philadelphia truck show.  
January 27-February 13—Troy, N. Y.  
February 1-8—Chicago pleasure car show; National Association Automobile Manufacturers.  
February 3-8—Washington, D. C.  
February 10-15—Chicago truck show.  
February 8-15—Hartford, Conn.  
February 10-15—Ottawa, Ont.  
February 10-15—Minneapolis.  
February 12-15—Geneva, N. Y.  
February 11-15—Binghamton, N. Y.  
February 15-22—Newark, N. J.

## Coming Motor Events

February 15-22—Albany, N. Y.  
February 16-23—Richmond, Va.  
February 17-22—Kansas City.  
February 18-19—Madison, Wis.  
February 18-21—Grand Forks, N. D.  
February 18-22—Baltimore, Md.  
February 19-22—Evansville, Ind.  
February 19-22—Bloomington, Ill.  
February 19-22—Geneva, N. Y.  
February 19-23—Topeka, Kans.  
February 19-23—New Orleans, La.  
February 22-March 1—Brooklyn, N. Y.  
February 20-March 1—Toronto, Canada.  
February 24-March 1—St. Louis, Mo.  
February 24-March 1—Memphis, Tenn.  
February 24-March 1—Cincinnati, O.

February 24-March 1—Omaha, Neb.  
February 24-March 1—Paterson, N. J.  
February 24-27—Kansas City truck show.  
February 25-March 1—Syracuse, N. Y.  
February 26-March 1—Fort Dodge, Ia.  
February 26-March 1—Glen Falls, N. Y.  
March 3-8—Sioux City, Ia.  
March 3-5—Cincinnati commercial show.  
March 3-8—Bridgeport, Conn.  
March 3-8—Pittsburgh, Pa.  
March 3-9—Des Moines, Ia.  
March 5-8—Tiffin, O.  
March 5-8—Louisville, Ky.  
March 5-8—London, Ont.  
March 8-15—Boston, Mass.  
March 11-15—Truck show, Des Moines, Ia.  
March 19-25—Boston, Mass.  
March 20-24—New Orleans, La.  
March 24-29—Indianapolis, Ind.

## CONTESTS.

May 30—Indianapolis speedway meet.  
June 25-28—Chicago Automobile Club reliability to Boston, Mass.  
July 12—French grand prix.  
November 25—Vanderbilt road race at Savannah, Ga.  
November 27—Savannah grand prix.



# Show Enthusiasm Hits Philadelphia

PHILADELPHIA, Pa., Jan. 18—With no formal ceremony beyond the turning on of the switch that loosed a flood of light throughout the building, the twelfth annual show, conducted under the auspices of the Philadelphia Automobile Trade Association, opened tonight and was launched on a successful 2 weeks' career in the mammoth new garage of the Automobile Club of Philadelphia, on Twenty-third street between Market and Chestnut. The exhibition will continue afternoon and evening every day except Sunday until February 1 and as heretofore will be divided into two sections, the first week being devoted to pleasure cars, both gasoline and electric, and accessories. The second week commercial vehicles will be on view, together with a holdover accessories display.

It is an all-American exhibit. Sixty-nine separate makes of gasoline and electric pleasure cars, showing in all about 300 cars, together with twenty-five accessories dealers, presenting a more varied array of motor car incidentals than has ever been assembled before in Philadelphia, comprise the exhibition.

Three floors, each containing approximately 30,000 square feet, are given over to the exhibition which started tonight. This is far more space than heretofore has been available in both the old armories combined, but it was needed, for in the number of exhibits, their variety and completeness, it is the most comprehensive and representative show ever held in Philadelphia, and if first-night attendance is any criterion it will set a mark hitherto unapproached.

The first floor has been converted into an Italian garden, scattered about which are Venetian urns mounted with mosaic globes lined with electric lights. Overhead are streamers of leaves, caught up from pillar to pillar with ornamental wreaths. On the second floor is portrayed a realistic autumn scene, with pergola and trellis effects, the blank wall being covered with a road scene in which the motor car occupies a conspicuous place.

On the third floor are southern California scenes. Overhead is sky, through which glisten electric bulbs in imitation of stars. Around three of the walls is a representation of an old Spanish wall, the fourth containing a characteristic California landscape. On each of the floors an orchestra discourses music throughout the evenings.

The accessories exhibit, shown on the third floor, is a comprehensive one and includes all the standard incidentals and appurtenances that contribute to complete a car in every detail. The accessories feature will hold forth throughout the first week and a portion will hold over during the second week.

## Quaker City Takes 2 Weeks to Inspect 1913 Motor Car Models

Simultaneously with the opening of the show in the garage of the Automobile Club of Philadelphia, the First Regiment armory opened its doors on the first annual domestic and importers' exhibition conducted under the auspices of the newly organized Philadelphia Automobile Board of Trade, Ltd. The Importers' Salon consists of ten different foreign makes and the American section an equal number.

The Mercedes, Isotta-Franschini, Minerva, de Dion-Bouton, Metallurgique, Lancia, Canadian Keeton, Renault and Panhard comprised the exhibits in the Importers' Salon, while the American section

consisted of the National, Cutting, Abbott-Detroit, Klinekar, Marathon, Chevrolet, Hupmobile, Nyberg, Warren and Schacht cars.

### NEW INSURANCE RATES

New York, Jan. 18—The Automobile Underwriters' Conference has adopted a new schedule of rates to apply in the eastern and middle states. The rates do not apply to the west because of the formation of a western conference.

The new rates for all private pleasure gasoline cars are divided into two classes, as follows:

Class 1—Cars in hands of original owners during the first and second year for cars of list prices ranging from \$3,500 up and cars in hands of original owners for first year for cars of list prices ranging from \$3,500 downward, as shown in the accompanying table.

Class 2—Including all cars not included in class 1, irrespective of their year of make, but excluding second hand cars. See accompanying table.

### NEW INSURANCE RATES SET BY EASTERN CONFERENCE

#### CLASS NO. 1

ORIGINAL LIST PRICE OF CARS WHEN NEW (NOT SECOND HAND), EXCLUDING COST OF ADDITIONAL EQUIPMENT AND EXTRA BODIES

Amount For Insurance Includ. additional and Equipment	\$6,500 and up	\$5,500 to \$6,499	\$4,500 to \$5,499	\$3,500 to \$4,499	\$3,000 to \$3,499	\$2,500 to \$2,999	\$2,000 to \$2,499	\$1,500 to \$1,999	\$1,300 to \$1,499	\$1,100 to \$1,299	\$900 to \$1,099	\$700 to \$899
	A	B	C	D	E	F	G	H	J	K	L	M
\$6,500 and up...	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
\$5,500 to \$6,499...	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
\$4,500 to \$5,499...	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
\$3,500 to \$4,499...	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
\$3,000 to \$3,499...	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
\$2,500 to \$2,999...	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%
\$2,000 to \$2,499...	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%
\$1,500 to \$1,999...	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%
\$1,300 to \$1,499...	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%
\$1,100 to \$1,299...	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%
\$900 to \$1,099...	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%
\$700 to \$899...	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%
\$500 to \$699...	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
\$400 to \$499...	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%

All cars listed at less than \$700 take a rate of 2% per cent. Irrespective of the amount insured, but the minimum shall be \$12.50.

#### CLASS NO. 2

ORIGINAL LIST PRICE OF CARS WHEN NEW (NOT SECOND HAND), EXCLUDING COST OF ADDITIONAL EQUIPMENT AND EXTRA BODIES

Amount For Insurance Includ. additional and Equipment	\$6,500 and up	\$5,500 to \$6,499	\$4,500 to \$5,499	\$3,500 to \$4,499	\$3,000 to \$3,499	\$2,500 to \$2,999	\$2,000 to \$2,499	\$1,500 to \$1,999	\$1,300 to \$1,499	\$1,100 to \$1,299	\$900 to \$1,099	\$700 to \$899
	A	B	C	D	E	F	G	H	J	K	L	M
\$6,500 and up...	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%
\$5,500 to \$6,499...	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%
\$4,500 to \$5,499...	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%
\$3,500 to \$4,499...	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%
\$3,000 to \$3,499...	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%
\$2,500 to \$2,999...	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%
\$2,000 to \$2,499...	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%
\$1,500 to \$1,999...	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%
\$1,300 to \$1,499...	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%
\$1,100 to \$1,299...	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%
\$900 to \$1,099...	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%
\$700 to \$899...	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%	2 1/2%
\$500 to \$699...	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
\$400 to \$499...	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%

All cars listed at less than \$700 take a rate of 3 1/2% per cent. Irrespective of the amount insured, but the minimum premium shall be \$12.50.

Deductions.—A reduction of 1/4 of 1 per cent on cars in class No. 1 and 1/4 of 1 per cent on cars in class No. 2 will be allowed for the elimination of theft and valued policy clauses by use on the following form of endorsement:

Electric Motor Cars.—Rate for all models 1 1/2 per cent, subject to a reduction of 1/4 of 1 per cent for the elimination of theft and valued policy clauses, using for this purpose the same endorsement as that provided for gasoline cars.

Steam Motor Cars.—Cars of current year, rate not less than 3 per cent. Cars built one year prior to "current year," rate not less than 3 1/2 per cent. Subject to reduction of 1/4 of 1 per cent if boiler and burner are located in front of dashboard.

Commercial Motor Cars shall be written at the schedule rates and for amounts as provided for "private pleasure motor cars" in class No. 2.

Second-hand Cars.—Cars in hands of other than the original purchaser of the car, when new, shall in no case be insured for an amount in excess of the cost of same to the insured.

# Motor Cars Figure in Many Messages

**D**ENVER, Colo., Jan. 17—An urgent plea for the construction of good roads throughout Colorado has just been presented to the state legislature by Governor Elias M. Ammons, who was inaugurated January 14. This call for extensive highway improvement, which the new governor has given the most prominent place in his first message to the legislature, is as follows:

Perhaps the most urgent necessity upon us at the present time for the advancement of farming, mining and all kinds of industrial pursuits is the construction of a systematic network of highways throughout the state. We have many sections of good roads, but in very few places are they properly connected. In order to carry out a harmonious plan we must first build the main arteries reaching all sections of the state and make connections with every locality easy.

To bring about such a result the work must be under the supervision of some efficient centralized body. Such a system would not only enable us to reach, settle up and develop every portion of our state, but it also would furnish the best possible means to secure the tourist travel now looking for an opportunity to visit the Rocky mountains. Even with our present disconnected system of highways, motor tourists are visiting most portions of the state and advertising to the world our wonderful variety of scenic beauty. We are especially favored with natural attractions and all we need to secure the lion's share of this travel is the construction of good roads.

In 1914 the transcontinental highways will be lined with motor cars, headed toward the Panama expositions on the Pacific coast, and unless we complete the main arteries of our systems by that time we can hope for but little of this trade. If we have our highways in good condition we may reasonably hope for most of it, because in no other place within the same amount of territory can so many scenic attractions be found. We will doubtless induce many people to build summer homes under the most inviting climatic conditions to be found anywhere, and no doubt many new permanent residents and much capital will be brought to us. Within the limits of our state we have a great variety of beautiful mountain parks, perhaps no two of which are alike. Roads connecting these must pass through constantly changing scenery of parks and groves and canyons, and, with our system of highways properly connected, tourists may spend an entire summer here and see something new and interesting each day.

To be ready for the advantages of 1915 we must commence work now, and I sincerely hope that the general assembly will make speedy arrangements for unlocking our road funds, secure the co-operation of the several counties, and such funds as may be enlisted from outside the state in the united harmonious effort to complete our road system at the earliest date possible.

To supplement the funds now available, we should continue to use the convicts at the penitentiary and reformatory, and there is hope of a considerable contribution of funds from the east through those who are anxious to have a portion of the main continental highway pass through Colorado mountains.

In addition to this there seems to be a strong possibility that congress will cede to each of the public land states an additional million acres of land for road building, and I hope in the near future we shall be able to induce the federal government to cede to us in reasonable amounts a score or more of the most beautiful sites in the state and dedicate them for park purposes. With people from all over the country wishing to visit our mountains, it seems to me reasonable to hope for such assistance in this direction.

## Ohio's Governor's Recommendations

Columbus, O., Jan. 20—Governor Cox in his first message to the Ohio general assembly recommended the passage of a law grading the fees to be charged for registration of motor cars on the horsepower developed. He recommended the codification of the road laws of Ohio in order that the conflicts and ambiguity should be removed.

He asked the adoption of a law re-

## Governors Make Recommendations to the Various Legislatures

quiring the use of split log drags on the public highways. He asked for a law to improve the old National road from Bridgeport, the eastern terminus, across the state to Eaton, the western terminus.

State Highway Commission Marker of Ohio in his annual report submitted recently to Governor Harmon, urges that the necessary legislation be enacted to give the state authority to maintain and repair all inter-county roads, whether constructed by the state, county commissioners or township authorities. He thinks the state should pay a portion of the cost of bridges over these roads and that convict labor should be used in road construction and repair. If the county commissioners fail to make application for state aid to improve a particular road, Commissioner Marker believes the state should go ahead and not wait a year, as at present, for the township authorities to act. He indorses the proposed appropriation of \$1,760,000 to begin the construction of the inter-county system in the state of Ohio.

## Views of Wisconsin Governor

Madison, Wis., Jan. 20—For the first time in the history of Wisconsin, the motor car, its use, operation and the consequences thereof received treatment in the biennial message of the governor of Wisconsin, at the opening of the 1913 Wisconsin legislature on January 9, and the manner in which Governor Francis E. McGovern discussed the subject proves that in Wisconsin the motor car has been placed in the rank it deserves.

The governor arrives at the conclusion that after all the proper theory of taxing motor cars is, on the basis of the effect their use and operation may result in by reason of wear and tear on roads. Thus, he suggests, the present uniform license fee of \$5 per car per year be changed so that owners be required to pay a fee based on the weight or horsepower, the lightest cars to pay the minimum and the heaviest and highest-powered cars to pay a maximum fee, which shall not be oppressive nor out of proportion, but reasonable and just, the principal underlying idea being to make the cars which involve the heaviest wear and tear on the streets and highways by reason of their weight or power pay the largest amount and giving the owners of the small cars the benefit of the lesser wear and tear they effect.

The proceeds of this tax, the governor says, should accrue to the state highway fund, instead of being parcelled out pro-

rata to the county as at present, so that there may be more intelligent and efficient work in the direction of constructing and maintaining lines of traffic in continuity, to connect the principal villages and cities of the state and eventually result in a system of state highways. Under the present system, whereby the net proceeds of the motor car registration tax goes back to the county of origin, he says the funds are frequently frittered away and a few short stretches of road constructed which begin nowhere and end nowhere and are not of much use.

The employment of Wisconsin convicts in the building of permanent highways is urgently advocated by the governor, and this, his first declaration in favor of convict labor in highway construction, forms a feature of his message.

It is interesting to note that the very first bill introduced in the 1913 legislature was senate bill No. 1, appropriating \$450,000 in addition to sums already appropriated for state aid to road building, making the total annual appropriation for 1913 the sum of \$800,000.

## Delaware Wants Commissioner

Wilmington, Del., Jan. 20—Governor Pennewill, in his biennial message to the general assembly, recommends the establishment of a state commissioner of motor vehicles, whose duty it shall be to issue the licenses for all motor vehicles and their operators and have general supervision over the use of such vehicles in the state, the chief object, aside from relieving the secretary of state of the duty of issuing the licenses, being to provide a state officer who can give direct attention to the enforcement of the law in the state of Maryland.

## North Dakota's Views

Bismarck, N. D., Jan. 18—Governor L. B. Hanna of North Dakota in his inaugural address devoted much space to the motor car and good roads. Inasmuch as it costs the farmer more to haul a bushel of wheat 15 miles over an average North Dakota road than it does to ship it by freight to Minneapolis or Duluth from his station, the governor considered the subject carefully. When the income from motor licenses amounting to \$30,000 a year is apportioned now among the counties the governor said that it amounts to little to any one county. He suggested amendment of the constitution to authorize issue of road bonds, which would take 6 years to become a law. By that time the tax would be \$100,000 a year, which would pay the interest on \$1,000,000 bonds at 4 per cent and leave \$60,000 for a sinking fund. He said at least part of the state convicts might be employed on roads in the summer, those who have merited the warden's confidence.



# Four Concerns in Receivers' Hands

**COLUMBUS, O., Jan. 18**—Upon the application of Valentine & Co., of New York, dealers in oils and varnishes, Daniel McLarin was named receiver for the Columbus Buggy Co., of Columbus, by Judge Sater in the United States court late today. Mr. McLarin took charge of the large plant of the concern, located on Dublin avenue, almost immediately and announced that no let-up in operations would take place. In its petition Valentine & Co., allege assets of \$1,000,000 and liabilities approximating \$600,000.

The Columbus Buggy Co. was a reorganization of a concern of the same name which has operated a carriage factory in the Buckeye capital for more than a quarter of a century. C. D. Firestone is president; C. E. Firestone, secretary; J. F. Firestone, vice-president, and O. H. Perry, treasurer. It has preferred stock to the amount of \$1,300,000 and common stock to the amount of \$300,000.

It is alleged that many of the debts of the company are overdue and threats of litigation have seriously impaired the credit of the concern. This it is alleged has endangered the creditors' claims and a receiver was believed necessary. It is stated that vehicles, both horse-drawn and motor-driven to the number of 100 are being built and contracted for which will amount to about \$1,250,000. Stockholders are expecting a reorganization of the concern which will eliminate the present management.

Receiver McLarin, who is a brother-in-law of C. E. Firestone, qualified by giving bond in the sum of \$100,000.

## FRANK E. SMITH RESIGNS

**Indianapolis, Ind., Jan. 20**—The resignation of Frank E. Smith as general manager of the Newcastle plant of the Maxwell-Briscoe Motor Co. has been announced, and will become effective with the approval by the United States court of the recent sale of the Maxwell properties. Mr. Smith has not announced his future plans, but expects to continue in the motor car field. He has been co-receiver in Indiana for the United States Motor Co. and also is president of the Indiana Automobile Manufacturers' Association.

## RECEIVER FOR RANDOLPH

**Chicago, Jan. 20**—Proceedings in involuntary bankruptcy have been instigated, involving the Randolph Motor Car Co., of Chicago and Flint, Mich., a corporation of Delaware. The petition was filed January 3 by the Mercantile Printing Co., and Charles Cramer, C. Klare, and one Robyn, the last three commission salesmen; and recorded January 8. The Central Trust Co., of Chicago was appointed receiver for the district of Illinois and southern Michigan. The receiver has applied to the court for an order of sale.

## Columbus Buggy, Randolph, Searchlight Gas, Michigan Magneto in Courts

The corporation is capitalized at \$100,000.

Mr. Bohlbach, speaking for the receiver, expressed himself as of the opinion that the company was unquestionably insolvent, despite a contrary assertion by Attorneys Lipson & Levy to the contrary. He ascribed this condition to the lack of sufficient capital to float the business over the difficulties of a dull season. The accounts of the company have been found in such a condition that an accurate appraisal of the assets and liabilities has been found impossible after over a week of scrutiny. In the meantime further manufacture has been discontinued although repairs are being furnished present owners.

## TIRE MAKER SERVES NOTICE

**New York, Jan. 20**—The Batavia Rubber Co., claiming several concerns are building tires that closely resemble the Security non-skid, has served notice on the Seamless Rubber Co., Kelly-Racine Rubber Co., United and Globe Rubber Mfg. Co., Stein-Laplock Tire Co. and the C. H. Stoddard Rubber Tire Works that it will defend its rights in the courts if need be.

## RECEIVER FOR SEARCHLIGHT NAMED

**Chicago, Jan. 20**—Friendly receivership has been adopted as a means of a complete reorganization by the Searchlight Gas Co., of Warren, O., whose general offices are in Chicago. Upon the petition of the Continental and Commercial National Bank of Chicago, Horace B. Pearson was appointed receiver by United States Judge William L. Day. The bank appraises the liabilities of the company at \$200,000, part of which is in notes due, and assets to the amount of \$400,000, not all of which is available for immediate conversion into cash.

The present financial condition is not one of insolvency, but of temporary embarrassment, and is attributed by the receiver to the service expansion that has been carried on by the concern in such volume as to exceed the adequacy of the capital of the company. As the maintenance of service stations is one of the principal essentials of the business, this expansion is regarded as indispensable to the welfare of the business, and it is thought that a general rehabilitation of the financial condition of the company will be beneficial. The receiver has been instructed to continue active business.

## MICHIGAN MAGNETO CO. BANKRUPT

**Detroit, Mich., Jan. 20**—The Michigan Magneto Co., doing business at 117 Bagley avenue, has filed a voluntary petition in bankruptcy in the United States dis-

trict court at Detroit. Upon petition of the Stackpole Battery Co., of Pittsburgh, Pa., Judge Arthur J. Tuttle has appointed Charles C. Simons receiver with orders to sell the property of the company January 30 at 10 o'clock in the morning. Simons' bond as receiver has been fixed at \$5,000.

In its petition to be declared bankrupt the company set up that it owes debts which it is unable to pay in full and that it is willing to surrender such property as is not exempt under the bankruptcy laws for the benefit of its creditors. Its debts include \$44.73 as taxes due the city of Detroit and \$135.17 as wages due employees. The liabilities are given as \$31,050.26 and the assets as \$28,415.85.

In the list of unsecured creditors appears the name of J. S. Bretz company, of New York, \$5,027.25, notes, and the Reo Motor Car Co., of Lansing, \$800, notes. The company declares that outside of the list of assets given there are assets totaling \$7,902.05, of which the greater portion is doubtful or uncollectable.

## KNOX COMPANY REORGANIZING

**Springfield, Mass., Jan. 22**—Special telegram—The Knox Automobile Co., of this city, which has been operated under the trusteeship for the past 4 months, due to technicalities caused by the death of the late A. T. Mayo, treasurer of the company, is at present on the eve of reorganization with increased capital. When such is complete will be known as the Knox Motor Car Co.

Sufficient new capital is already subscribed to make it possible for the company to largely increase its output and to further facilitate this the number of passenger car models will be reduced and their output proportionately increased. In order to achieve the formation of the Knox Motor Car Co., it will be necessary for formal bankruptcy proceedings during which, however, it will not be necessary to cease manufacturing operations.

## EMISE TO BUILD A CAR

**New York, Jan. 31**—Several members of the old Lozier organization and one or two who are not at present connected with the concern have organized a company to manufacture a counterpart of the present Lozier light six under the name of the Emise Motor Car Co. It is understood that the company will be formed in Cleveland, O., and that the car will be made to sell at a figure below \$2,000. Officers of the new company will include C. A. Emise, sales manager of the Lozier company; Sam Regar, former treasurer; W. S. Mead, sales manager of the New York Lozier branch and F. C. Chander, former second vice-president of the Lozier company. The engineer will be T. V. Whitback. Organization plans contemplate the manufacture of about 5,000 cars for the coming year.



# Seitz Takes Over Grabowsky Assets

**D**ETROIT, Mich., Jan. 18—Stockholders of the Seitz Automobile Transmission Co., of Wyandotte, have purchased the property of the bankrupt Grabowsky Power Wagon Co., of Detroit, with the exception of the buildings and machinery, and will begin operations in a separate plant at Wyandotte Monday. The Wyandotte plant is to manufacture the Grabowsky truck. The Seitz company officers are to resign and the company is to be reorganized and is to become successor to the Grabowsky company.

For the present George A. Horner, who has been manager of the Grabowsky Detroit plant for the creditors, will be general manager of the Grabowsky plant at Wyandotte. The factory at Wyandotte, in which the Grabowsky trucks will be manufactured for the present, is two stories in height and 325 by 60 feet in dimensions. About 100 men are being employed in this department at the present time.

The sale of the assets to the Seitz stockholders was made by Referee Lee Joslyn, of the bankruptcy department of the United States court at Detroit and the sale has been confirmed. The assets not covered in the Seitz transaction were purchased by Samuel Winternitz & Co., of Chicago.

## OVERLAND HAS FIRE LOSS

Toledo, O., Jan. 18—Nine motor cars and six freight cars were included in the \$8,000 loss incurred when fire destroyed a big loading dock at the Willys-Overland factory, Wednesday night. The blaze started at 7:30 o'clock and lasted several hours. Five box cars and a flat car loaded with motor cars for foreign shipment, and two box cars containing motor cars for domestic shipment were on the track and were partially burned. The fire is thought to have started in the tool room where craters were at work with excelsior and packings. The private fire department of the Willys-Overland Co. did magnificent work or the loss probably would have been much greater. The loss was covered by insurance.

## STUDEBAKER TO MAKE TRUCKS

Detroit, Mich., Jan. 20—The Studebaker Corporation announces its intention of marketing, during the coming year, a complete line of gasoline commercial cars, ranging in size from light delivery wagons to high-duty trucks. These models are links in the chain of four chassis types which, with varying gear ratios, frames, tires and bodies will cover a range of from 1,500 to 12,000 pounds. The other models are now undergoing test at Detroit. The Studebaker designs are by Albert F. Mais, who took charge of this department more than a year ago.

A distinctive feature of all models is

## Wyandotte Concern Will Become Successor to Defunct Truck Company

the internal-gear drive. The power unit, composed of motor, clutch, transmission, steering gear and control levers, is provided with rings by which the entire unit can be easily lifted out and replaced. The front axle is a unit in itself, as is the rear axle, the load-carrying part of which is forged and of I-beam construction. Frames are flexible, with integral gussets for carrying cross members. The new trucks have four speeds, three sets of brakes, an expanding shoe clutch, metal to metal, and carry a large safety factor in all models. Designer Mais has placed the automatic governor on the counter-shaft.

At first, Studebaker trucks will be sold only in New York, Boston, Philadelphia, Chicago, Los Angeles, and San Francisco, through truck departments added to the respective branches. The bodies will be built in the corporation's South Bend plants.

## DAY COMPANY ELECTION

Detroit, Mich., Jan. 20—At the annual meeting of the Day Automobile Co. the following officers were elected: President, Thomas W. Day; director and factory manager, A. W. A. Bartlett; secretary, William S. Power; treasurer, John E. Murphy; director, William J. Emery. The company, which was recently formed, manufactures a utility car, a combination of a pleasure car and a commercial car, and beginning February 1, expects to turn out at least three cars a week. It is planned to make between 200 and 300 cars this year. Arrangements are under way to increase the working capital.

## NEW RUBBER CONCERN ORGANIZING

Akron, O., Jan. 20—The Mohawk Rubber Co., with a capitalization of \$350,000 is to be organized in a few days. Of this amount \$250,000 will be common stock and \$100,000 7 per cent cumulative preferred stock. Organizers of the new company are R. M. Pillmore, J. K. Williams and S. S. Miller.

The new company will purchase the real estate, buildings, machinery and plant of the Stein Double Cushion Tire Co., located in East Akron, which consists of about 2½ acres of land, a factory in good condition, switching facilities and water, having a capacity of from seventy-five to 100 tires per day.

## MANSFIELD COMPANY ELECTION

Mansfield, O., Jan. 20—At the annual meeting of the stockholders of the Mansfield Tire and Rubber Co., at Mansfield, O., the following officers were elected; Judge C. T. Grant, of Akron, president; G. W.

Henne, vice-president and general manager; Jesse E. LaDow, secretary; W. F. Henne, treasurer. These with Dimon Herring, William Isaly, Charles Hoffman and John Schauer of Troy will comprise the board of the ensuing year.

The report made to the board shows that since the company has been actually running for 6 months it has made a net earning of 12½ per cent on the stock issued, which amount carried into the business of the company and a stock dividend of 10 per cent was declared out of the stock in the treasury.

The board of directors ordered \$8,000 worth of new additional machinery purchased of the latest type and this will be installed yet this month if possible.

## FIRE IN BUICK PLANT

Detroit, Mich., Jan. 18—Fire of unknown origin destroyed the brass and aluminum foundry of the Buick company at Flint yesterday with a loss estimated at \$50,000. The foundry will be rebuilt at once and only a few men will be laid off temporarily. The loss of the foundry will not hamper the Buick plant to any extent as enough castings are on hand to run the plant until arrangements can be made for getting more. The burned foundry was known as factory No. 15.

## MAXWELL OFFICES MOVING

New York, Jan. 20—Controlling interests of the United States Motor Co. have leased offices in the United States Rubber building on Columbus circle, which will be used for the New York headquarters of the new Maxwell Motor Co. as the reorganized company eventually will be known. The principal executive offices of the big holding corporation will be located at Detroit.

A fourth and final assessment of \$16.80 a share on the preferred and common stocks of the United States Motor Co. and the subsidiary Columbia Motor Car Co. is payable February 3 at the Central Trust Co. This represents 70 per cent of the \$24 assessment.

## FINDLAY PLANT SOLD

Findlay, O., Jan. 18—The Findlay Motor Co. plant was sold Thursday, to J. G. Cleary, of Milwaukee, Wis., for \$50,000. The sale was made under orders from the United States court at Toledo, and sold for just the price the court stated should be the lowest bid that could be accepted. The company was promoted by L. E. Ewing, of Cleveland, who secured \$100,000 of local capital. The company has been in the hands of John M. Barr, as receiver, since September 19, 1911.

It is the intention of Mr. Cleary to dismantle the plant and remove the machinery to Milwaukee, Wis., where it will be used in other industries.

# French Motorists Insist Taxes They Pay

PARIS, Jan. 6—"We pay well and we ought to be treated well," was the text of a speech by Marquis de Dion at the French chamber of deputies, in favor of an increase in the allowance for road maintenance. Marquis de Dion pointed out that French road users last year paid \$18,000,000 in taxes of all kinds, and of this sum only \$6,000,000 had been used for the upkeep of roads and \$12,000,000 for various other purposes. This total of \$18,000,000 comprised the special taxes on horses, mules, carts, motor cars and bicycles, also a proportion of the taxes on gasoline and lubricating oils. It therefore

is a special tax paid exclusively by road users, but only 33 per cent of the amount is used for the benefit of the persons having contributed to the tax. It was convincingly proved that the allowances for road maintenance have not been in proportion to the increase in traffic and to the amount paid by the users of the road in France.

## Collections in 1882

In 1882, when motor cars did not exist and bicycles were not taxed, the amount obtained from road users was \$2,936,377, and the expenditure on road maintenance \$5,207,165. Ten years later taxes paid by

road users only reached a total of \$3,409,063, and the expenditure on road upkeep was \$5,487,633. In 1902, by which date there were 10,000 private cars in France, the income from road users was \$4,898,679, exclusive of gasoline taxes, and the amount spent on road maintenance was \$5,787,325, small in comparison with what is spent nowadays.

In 1911, the latest year for which statistics are available, the road taxes amount to \$18,072,729, of which amount \$11,600,000 was obtained from gasoline and oil consumed by motor cars and \$6,472,729 in payment of direct road taxes. Notwith-

STREAM-LINE bodies are the present European craze. The problem that designers have set themselves is to produce a body which will offer the smallest amount of head resistance, which will have an unbroken line from radiator cap to rear spring hanger, and which will provide these advantages without any loss of seating capacity or any reduction of baggage-carrying space. It is a difficult problem, for stream lines generally entail a serious sacrifice of the conveniences attending more orthodox body construction.

Turcat-Mery, one of the leading French car firms, has made a contribution to this class of car of such a nature that the

## Extreme Ideas on Stream-Line Bodies

term original is thoroughly justified. The chassis is a standard 40-horsepower touring model and the body a four-passenger one. Unlike the ordinary type of body, it is impossible to divide this construction to its components of bonnet, body, running boards, fenders, and hood—yet all these units exist. The sides of the body are built out so as to encase the running boards. Thus the sides are vertical for the greater portion of their height, then to meet the ends of the seats.

The width of the seating accommodation is practically that of the frame, as on an ordinary car; in other words the body overhangs but the passengers do not. There are two doors on each side, with invisible hinges and fasteners, the method of opening the door being to give an outward pull of the whole door, then swing it on its hinges. A full width running board is available, but it is not visible until the door is opened. There

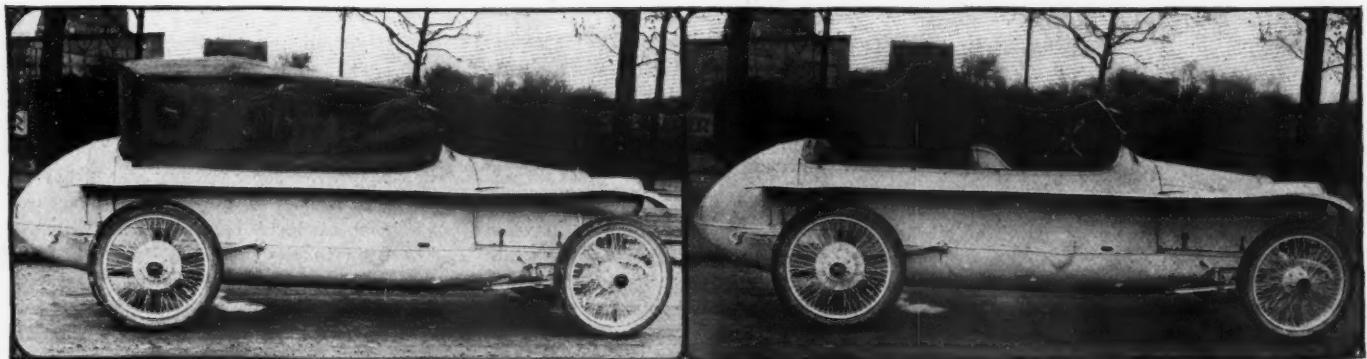
is the advantage that baggage carried on the running board is inside the car and therefore fully protected. Obviously the brake and change-speed levers come inside the body, even although the chassis design places them right outside the frame members.

On the outside of the front left-hand seat, a series of drawers is built up on the running board, the bottom drawer being on the board and the top one under the inswept side panel. These drawers can carry all the spares and tools a modern car requires and could not be more conveniently situated. The gasoline tank is under the dashboard, a projecting neck being fitted to the filler for convenience in replenishing. Spilled gasoline will flow on to the foot boards, and not onto the varnished body.

While the distinctive type of Turcat-Mery radiator is maintained, the bonnet is merged into the body to such an extent that it loses its identity. As can best be seen from the illustrations, the lower portion of the bonnet flares out into the front fenders. The electric headlights form an integral part of the fenders in a manner than can be better understood by reference to the illustration than by a verbal description. The two side lamps form eyes in the scuttle dash. Viewed



NOTE HEADLIGHTS ON TURCAT-MERY



TURCAT METHOD OF PUTTING TOP ON NOVEL STREAM-LINE BODY IT MAKES



# Should Be Used on Road Improvement

standing the great increase in revenue, the amount voted for the upkeep of highways was only \$6,100,000. In other words, the gasoline tax alone was nearly double the amount spent on road maintenance in the French republic.

## Campaign Is Successful

The campaign for better roads appears about to be successful, for although the government would not accept the proposal of Marquis de Dion to increase the grant for road maintenance to \$7,200,000, it was announced that in addition to the budget of \$6,853,800 there would be a special credit of \$1,600,000 to be used for the

reconstruction of deteriorated highways during the year 1913, which is good news for French motorists.

During the parliamentary debate on the taxation problem it was pointed out that a 15-horsepower car covering annually 13,000 miles paid \$99 in taxation to the state, and, if used in Paris, an additional sum of \$61. A 25-horsepower car contributed \$163 annually to the state and \$93 to the city of Paris if owned in the city. A 40-horsepower car covering a mileage of 22,000 in the year paid \$258 to the state and \$150 went into the coffers of the city of Paris.

The amount per kilometer spent on road maintenance in 1882 was \$138.70; in 1892 it was \$145; in 1902 it was \$152, and in 1911 it had been increased to \$159.20. This applies to the 38,230 kilometers of national highway only, local roads not being considered. The figures show a slight increase, but this is only just sufficient to cover the increased cost of labor and material. In very many districts the actual allowance has been decreased and even in the districts where an increase has been provided for it is explained by special repair work necessitated by years of insufficient credit.

## as Brought Out by French Designers

head on, there is a certain resemblance to a shark, and it is this title which has been given to the body.

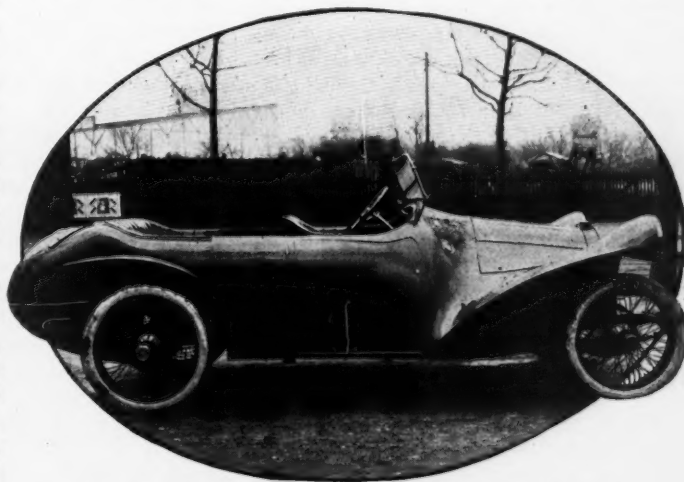
The peculiarity of the rear construction is the egg-shaped stern and the invisible top. The top is of quite an ordinary type, but owing to the outward sweep of the body it comes inside this latter when lowered, being covered up at the back by the lid over the egg-shaped stern and at the sides by a couple of small wood panels. This design has been patented by Henri Rougier, who will be remembered as one of the early French race drivers. The four seats come within the wheelbase of the car. Set across the car, back of the rear seats, are a couple of spare wheels, these being rendered accessible by lifting off the panel on the top of the "egg," the removal of this panel also laying the hood bare.

Back of the spare wheels, still inside the egg-shaped stern, is a large sized locker. It is capable of taking a couple of grips, but owing to it being right outside the wheelbase, it would be best used for bulky but light wraps and coats. Even the tail lamp is included inside the body, for it consists of a small electric lamp within the rear locker reflecting on glass figures let into the egg-shaped stern. To complete the stream lines, the under-

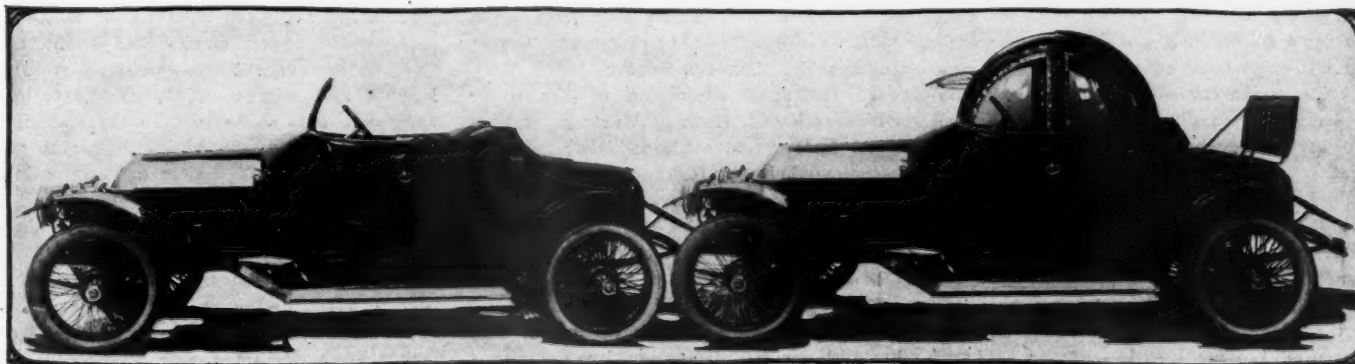
pan is made to harmonize with the main portion of the body. There is a fairly high clearance and no break underneath to set up eddies.

A dome-shaped two-seater inside steering body of an original type has been produced by the Phoenix body works, in Paris. Ignoring the top, the car is a two-seater torpedo with an emergency seat at the rear. All the originality, however, lies in the top, which is an all metal dome construction built in two parts and having side windows. The two halves of the dome top are pivoted at a common center on the rear-most door post, and can be swung down so as to go behind the seats, disappearing in the space provided between the back of the seats and the inside of the body. The forward half of the dome is of a slightly smaller diameter than the rear portion and fits inside this lat-

ter when both are lowered. Three positions are possible; a fully closed body; rear half of the dome swung behind the seats; and both portions swung down, leaving only the windscreen in position. This screen is attached to the top of the scuttle dash, thus remaining in position when the whole top has disappeared. When the car is used as a closed vehicle the front portion of the dome slides into the framework of the windscreen; this latter can always be adjusted for angle, whether the car is used as an open or closed vehicle. It is claimed that the complete weight of the body is 440 pounds.



SIDE VIEW OF EGG-SHAPED BODY ON TURCAT



DOME-SHAPED TWO-SEATER WHICH CAN BE USED AS EITHER AN OPEN OR INCLOSED VEHICLE



# Engineers Hear Papers and Discussions

NEW YORK, Jan. 18—The winter meeting of the Society of Automobile Engineers ended at noon today after 3 days of very profitable discussion by the engineers interested in the industry, who had been gathered here by the double attraction of the national show and the society's meeting. The first day was devoted to business and professional sessions, the chief interest of which was the election of officers. The afternoon was devoted to reports of the various divisions of the standards committee, while the evening was given over to a commercial vehicle session. Friday morning and afternoon witnessed two more professional sessions, while the evening was given over to the annual society dinner in the Louis XVI restaurant at the Hotel McAlpin. The meeting closed with a Saturday morning session in which technical papers were discussed. The day-by-day report of the professional sessions is given below:

In addition to a general business session on the opening morning of the society's meeting, reports of several divisions of the standards committee and of the electric lighting committee were read and acted upon.

## Report of Broaches Division

The third report of the broaches division was read by its chairman, C. W. Spicer, president Spicer Mfg. Co. The report was short and was characterized as essentially one of progress. There was no discussion, no new points being brought out which had not been touched upon in the general meeting of the standards committee on the day previous. There was no new data presented for consideration. The manufacture of broaches and splined shafts is still in its development stage and there is an increasing tendency toward the hobbing of splined shafts. The depth to which straight parallel sides can be cut by this hobbing method for six splined shafts seems limited and this may necessitate the changing of the tables relating to this work which have already been accepted by the society. It may be necessary to modify the form of the splines or to supersede the present tables by some dealing with a greater number of splines of a shallower cut. The depth is some function of the number of splines and the diameter of the shaft. The time during which the committee has been considering this point has been too limited to arrive at any definite conclusions as yet. The dimensions which have been adopted for squares and tapers seem to be meeting with approval by the manufacturers, Mr. Spicer said. The report was accepted as one of progress.

Chairman A. L. Riker's report of the proceedings of the miscellaneous division featured the modification of the table of magneto dimensions accepted at the 1912

## Standardization of Magneto Dimensions Is Important— Electric Light Sizes

annual meeting of the society so as to read as follows:

FOUR AND SIX-CYLINDER MAGNETOS		
	MM.	Inches.
Shaft height.....	45.	1.771
Distance from center 2 front base-plate holes to large end of shaft taper.....	53.	2.086
Distance from center front base-plate holes to rear base-plate holes.....	50.	1.968
Distance from centers of base-plate holes left to right.....	50.	1.968
Large diameter.....	15.	.590
Small diameter.....	12.	.472
Length of taper.....	15.	.590
Taper 1:5 (including angle) 11 degrees 30 minutes approximately.		
Woodruff key No. 3		
Height of magneto space.....	203.	8.000
Length of magneto space.....	254.	10.000
Width of magneto space.....	127.	5.000
Plain hole timing lever.....	6.35	.25
Tapped hole timing lever, $\frac{1}{4}$ inch 28 pitch S. A. E.		
Base-plate holes, $\frac{3}{8}$ inch, 16 pitch P. U. S. F.		
Thread for end of magneto shaft $\frac{3}{8}$ inch, 16 pitch U. S. F., length of thread, .5905		
Advance lever radius 2.125 inches		

The first nine items of this table remain unchanged from the former table, while those referring to the heights, widths and lengths of magneto spaces have been combined so that there is only one size of space, regardless of whether the design is for the accommodation of a four or a six-cylinder magneto. The specification for base plate holes has been changed to  $\frac{3}{8}$  inch, 16 pitch, U. S. F., as here noted. The only added points are for the thread for the end of the magneto shaft and for the advance lever radius.

In the report, the S. A. E. standard yoke and rod ends were taken up and it was recommended that certain plain yoke ends be added to the list standardized. That is, ends which are plain as differentiated from ball-and-socket types. It was further recommended that the specifications for the tensile strength and elastic limit of the standard screw thread material as previously fixed upon be stricken from the standards for the reason that the society should not dictate as to the quality of materials used, but rather should confine its specifications as to dimensions.

## Discuss Miscellaneous Report

In the short discussion of the paper which followed, Howard Marmon, of Nordyke & Marmon, explained that the new recommended standard end is similar to the present adjustable end which has an extremely long clevice, except that it has a shorter end for use where such a long clevice is not required for adjustment.

The question of the practicability of the S. A. E. standard screw threads was brought up for discussion by the president. There seems to be some difficulty

in using these standards for small sizes, some makers having to go back to the U. S. standards in these sizes. J. O. Heinze, of the Northway Motor Co., stated that in the plant with which he is connected the U. S. standards are used in cast iron and aluminum work, while the S. A. E. threads are used for nut ends and the like. Mr. Marmon expressed substantially the same opinion on this point. It developed that in its fixing of these thread standards the division has already recognized that the S. A. E. threads are impractical for cast iron and aluminum.

A. L. Riker, of Locomobile company, in speaking of the striking out of the physical specifications for elastic limit and tensile strength, stated that there has been considerable feeling among the manufacturers of screws that this should be omitted, for the reason that those working to the S. A. E. standards in other respects did not want to pay the additional price made necessary by this demand for such high-class material. It is the opinion of these screw makers that the physical properties of the material should be left to each engineer. The miscellaneous division's report was accepted as read.

## Report of Electric Lighting Committee

Alexander Churchward, chairman of the committee on electric lighting and its allied features, read a report which primarily recommended a very open discussion in the meeting of the subject of single and double wiring systems so that the views of the engineers could be incorporated in the later recommendations of the committee. These two systems differ in that the single-wire system makes use of a ground for the return circuit, while the two-wire type uses a metallic return.

It was recommended that electric light bulbs be standardized and known as 7-volt lamps. These are to have an efficiency of 1.1 watts per candle at voltages ranging from 6.5 to 7 volts. The size for headlights was standardized for the  $2\frac{1}{16}$  inch size and capable of being focused in a reflector of  $7\frac{1}{8}$  inches focal length or greater. Diameter of side and rear lights are fixed at 1 inch. Battery makers are to be circularized with the view of arriving at two standard overall heights and widths of storage batteries for motor cars so as to give three standard plate sizes from which batteries of any capacity can be made by simply increasing the overall battery length. Lighting system manufacturers are also to be circularized to fix standards for fuses and dimensions for boxes. The report also touched upon the consideration of dimmers for headlights as suggested by legislation now in force or under consideration.

# Detailed Report of S. A. E. Meeting

The discussion on the subject of two-wire versus single wire installations indicated that the manufacturers of motor cars and also the makers of electrical apparatus will welcome the system of single wiring if it can be conclusively shown that its use is advantageous and not attendant with power loss and difficulty of maintaining proper grounds.

A. L. Riker stated that the electric lighting of motor cars is today in the same position as that occupied by the electric lighting industry in general 25 years ago. We should be able to adopt something as standard which will live and to profit by the experiences of the older and allied lighting industry. The single-wire system eliminates many of the present troubles, he said. Its difficulties of good ground return are more theoretical than actual. In favoring the single-wire system Riker added that if it is possible to eliminate some of the elements and fixtures now called for with the present double-wire systems, the modern automobile would look less like an electrical supply store and more like a real machine. The matter should be given deep consideration and not discarded without fair trial.

## Favors Ground Return

A. L. McMurtry, of the Aristos Co., stated that he has come to the conclusion that the single-wire arrangement is undoubtedly the simpler, especially in locating trouble. There is only one wire from the switch and only one to each of the lamps. In case of a short circuit, there is only one wire to disconnect, while with the two-wire system there are two to be considered unless it so happens that the right one is struck the first time. With a first-class grounded system there is less loss than in the poorly wired two-wire system grounded directly to the frame, said McMurtry.

R. H. Manson, of the Dean Electric Co., gave it as his opinion that any changing in systems should be done immediately rather than in the future, looking at the matter from the standpoint of the manufacturer. The single-wire system requires a bulb with a different base than the two-wire system lamp, so that the present lamp, with which supply stores everywhere are stocked, would be of no use, and it would take some time to effect the change in the dealers' stocks. In advocating the single-wire system, he cited the telephone circuit as an instance of a grounded system working satisfactorily, even though complicated.

Howard Coffin, of Hudson, advanced the point that the proof is in the eating and that he saw no reason for the retention of the present wiring if the other will work equally as well. Mr. McMurtry stated that half the troubles with lamps today is due to the delicate connections

## Comparative Data on Performance of Trucks With Regard to Size of Engine

made necessary with bulbs for the two-wire outfits. This becomes especially frail in the smaller sizes of lamps. The single-wire system would make use of very much simpler bases and sockets—the construction would be much more substantial.

Alexander Churchward, of General Electric Co., brought out another point when he said that in the case of grounds the single-wire system is bound to blow out something immediately the ground defect is made, while with the present system in the case of a ground there is only a slight leak, which is not immediately noticeable and which will gradually sulphate a battery and thus drain it almost unnoticeably.

## Car Compared to Office Building

J. O. Heinze was practically the only engineer who was somewhat opposed to the system, stating that in the great office building, for instance, we would not think of using one side of the building for a ground return. The two-wire arrangement he said gives twice the reliability.

E. T. Birdsall cited the example of the steel battleship which grounds all the electric lighting circuits on the steel hulls. Mr. Manson advanced the counter argument that in the steel building there are so many different kinds of circuits that insulating them is necessary. Such installations are not analogous to the much simpler car wiring systems, he said. In closing the discussion, Mr. Churchward stated also that the steel building illustration does not apply to motor car electric practice. All circuits in such cases are fed from the same mains, while in the car there are separate circuits for each unit.

The report finally was adopted as read.

## Trends of Foreign Design Low-Grade Fuel for Commercial Vehicles—Solid vs. Pneumatic Tires for Trucks

NEW YORK, Jan. 16—Members of the Society of Automobile Engineers at their regular meeting this evening devoted their attention to the commercial vehicle field. Four papers were presented and three set topics were discussed, nearly all of these precipitating lively discussions by the members present.

Papers presented were: Comparative data on performance of motor trucks with regard to the motor and gear ratios, by Cornelius T. Myers; low-grade fuel for motor trucks, by N. B. Pope, of Automobile Topics; tendency of foreign motor

truck design, by Lowell C. Freeman, and comparative results with solid and pneumatic tires on light commercial vehicles, by B. B. Bachman, of the Autocar company. The topics set for discussion by the engineers were worm gears, motor starters for commercial vehicles and metal wheels.

## MOTOR CAPACITY FOR MOTOR TRUCKS By Cornelius T. Myers

Two years ago I was called upon to make a report on the gasoline motor trucks exhibited at the New York show, for three concerns about to purchase in all nine trucks, varying in capacity from 2 to 5 tons. I was impressed by what I considered the large size of the motors installed to drive most of the trucks, and I tried to find out from several makers the points which governed their designers in the selection of the particular size and type of motor. I got almost no satisfaction and was inclined to think that in some cases the size was an approximation somewhat on the order of the old rolling-mill formula, calculate it big enough and then multiply it by two.

Having done some little estimating myself on this point, I got together as much as I could of the data necessary for making a comparison of the rated motive power furnished with the various trucks, in relation to the duty to be performed. I compared these figures to see whether there was any uniformity, but found little to show that any particular rule had been followed. In scanning the details of the various trucks, however, I was not so surprised at this, for there was also evident in other features of design a considerable divergence in the ideal before the designer.

## Truck a Compound of Compromises

I think I can say without fear of contradiction that all machine design is a compromise. If you will admit this, I think you also will agree with me when I say that the design of our beloved motor truck is a compound of compromises. Large wheels mean easy riding, less power and more road clearance; but an increase in unsprung weight, higher body platforms and greater first cost. Large sprockets mean lighter chain tension and less wear; but greater cost, less road clearance, and in some cases lower efficiency. Inswept fronts of frames allow a shorter turning radius, but mean increased axle stresses and less room under the hood or floorboards. Large motors afford power to overcome abnormally bad road conditions at high speeds; but entail heavier construction and more dead weight, more expensive transmission systems, greater fuel consumption and tire expense, higher maintenance expense or depreciation charges, and greater manufacturing cost.

These instances can be multiplied tenfold by going into the details of construction, and it is not hard to appreciate that a large amount of information and data is necessary in determining which point shall be favored in a compromise; and that very good judgment must be used in order to design a motor truck that is to be a commercial success—the acid test of all design.

Reliable data is what we most need to make steady progress. F-A-C-T-S, each letter a bold-faced capital, must be demanded; and never have I had to contend with fewer facts and more fancies than in my connection with the motor truck industry. Correct ideals, based on a careful study and analysis of the conditions underlying motor truck design, are essential; and the whole must be tempered by good business judgment of market conditions, and a never-failing appreciation of that old saw—the more haste the less speed, and I might add, the lighter pocketbook.

But in some cases it is hard to get absolute and authoritative data—and the motor truck designer faces many such. In the absence of some of these facts, we must proceed with caution toward a well-chosen ideal; certain standards must be assumed and experiments then carried on to check these standards and collect positive data.

I find but meager data on which to base the selection of motor sizes for trucks. This is the more regrettable, in my opinion, because I believe that this point will have a very considerable bearing on the development and general expansion of the motor truck industry. At our meeting last summer, Mr. Batzell presented a paper covering gasoline motor characteristics in a very thorough manner, and he advocated the adoption of motors much smaller than the average practice in motor trucks today. I will outline some of the conditions which must be considered in making the selec-



tion, and give the results of some work I have done along this line.

In order to operate a motor truck, its motor must be large enough to overcome a total resistance composed of five items:

1—The resistance due to the friction in the component parts of the transmission system. In chain driven trucks this is generally based on an average efficiency of 70 per cent. This, I think, can be bettered now that the owners and drivers more fully appreciate the large returns to be netted by a little careful and regular attention to working parts, and now that designers understand the essential requirements of the transmission system in the way of proportion and suspension—the best compromise for those parts.

2—Wind resistance. This is almost negligible except in the cases of high-speed delivery wagons and fire apparatus.

3—Acceleration. This is generally covered if the motor can easily overcome the other items, and provided the gearbox is properly designed.

4—Grade resistance. It goes almost without saying that the truck should be able to ascend light grades without shifting gears, unless the road resistance in item 5 is unusually high. The truck, fully loaded, should be able to take grades up to 3 per cent in high gear on good pavement.

5—Road Resistance. This is the most important and complex item of the five. It will depend upon the total weight of the loaded machine, the character of the road surface, the diameter and width and compound of the tires, and the diameter and type of the wheel bearings.

In making comparisons with regard to motor size, I have used a formula which is a relative one, covering four-cylinder four-cycle motors, developing rated S. A. E. horsepower. This gives the tractive effort in tons of total weight on the tires, for a transmission efficiency of 70 per cent.

$$E = \frac{23.52 \times d^2 \times s \times R}{D \times T}$$

E=Tractive effort in pounds—d cylinder bore.  
T=Total weight in tons—s cylinder stroke.  
D=Diameter of driving tires—R gear reduction.

#### Developing Tractive Factor

In the present state of the art of motor construction, I do not think it is unreasonable to expect a motor to develop 20 per cent more torque at normal operating speeds than the equivalent of the S. A. E. rating. This may be questioned by some, but I know that better results are being obtained from several different makes of motors, and I see no reason why so important a machine as a motor truck should be burdened with an inefficient motor. On the contrary, I think it is very important that only the most efficient and carefully designed motors should be considered fit for such service. The constant in the formula then becomes 28.22, and if the result is divided by 2,000 we shall have the tractive factor of any particular truck and motor as a percentage of the total load on the tires. This tractive factor will denote the relative ability of a truck and its power plant to any other—provided, of course, that the motors be given an equal amount of power per cubic inch of cylinder displacement, and the transmission systems are equally efficient.

The following tractive factors are averages covering trucks of well known manufacture as exhibited at the New York Show in 1911. They show what designers—or perhaps in some instances the sales department—considered good practice in 1910—the state of the art in that year.

1-Ton .....	0.0864
2-Ton .....	0.0730
3-Ton .....	0.0700
5-Ton .....	0.0616

Now, let us figure, as well as we are able, the resistance to be overcome by a truck under average conditions. This resistance factor should be the measure of the power of the motor and equal to the tractive factor. In most of my calculations I have used the figures given by Mr. Churchward on page 9 of the S. A. E. Handbook. Let us assume that with good tires the road resistance on hard, level asphalt is 20 pounds per ton, using this as a base in the table that follows. If we divide this by 2,000, we shall have the resistance factor .01 for this kind of road surface. Similarly, for the other six kinds of road surface there given we have:

Wood pavement .....	0.0115
Level macadam .....	0.0115 —0.0300
Plank road .....	0.009
Cobble stones .....	0.0175
Good dirt road .....	0.0110—0.0200
Ordinary country road (dirt) .....	0.0200
Sand .....	0.200

The French war office has given much attention to the motor truck, in fact the subsidies granted by the French government through its war office have had a very stimulating effect in increasing the average efficiency of the trucks made in that country, and in promoting the sale of these trucks. Capitaine Renaud, the motor truck expert of the French war office,

gives the following resistance factors, or coefficients de la route:

City pavements .....	0.013—0.017
Country roads .....	0.016—0.041
He uses a tractive factor = 0.041. Items 2, 4 and 5.	

Grade resistance is readily reduced to an equivalent resistance factor by dividing the percentage by 100. Three per cent grade = 0.030.

I think the average resistance for a macadam road can be taken at 35 pounds per ton—a resistance factor of 0.0175, which, added to the grade, gives a total resistance factor of 0.0475. This is the measure of the power required of the motor when working under the conditions given above, and to which the tractive factor should be equal.

#### Motor Capacity and Weight

Referring now to the actual tractive factors of the 1911 show trucks. Under average level road conditions these motors would be operating at the following percentages of their S. A. E. load ratings—21, 24, 24.8, 28.4. As against these figures the motor having a tractive factor of 0.0475 would be operating at 36.6 per cent of full load; or, the 1911 motors were respectively 75 per cent, 52 per cent, 48 per cent and 28 per cent larger than necessary. If the greater part of the routes of a large majority of these trucks is over pavements having a lower resistance factor than 0.0175, the overabundance of power is magnified, and by plotting these figures against the fuel consumption curve of the motor, the possible increase in gasoline mileage will be found to be very marked.

Quite a number of the 1911 chassis were very heavy or the tractive factors would have been considerably higher. The heavy chassis, of course, might be one reason why a large motor was chosen. The larger motor, however, has the disadvantage of still further increasing a chassis weight already high, thus making the cure a certain aggravation to the disease, and further decreasing the mileage per gallon of fuel. Inasmuch as fuel now costs about 50 per cent more than it did 2 years ago, and there are prospects of a further advance, this subject of fuel consumption must be seriously considered.

Coming now to the trucks exhibited and offered for sale in 1912, the figures given below show some improvement, but it is not a very marked one.

Size	Percentage of Average Load on Motor	Excess Motor Capacity	Tractive Factor
1-Ton .....	22.1	66.0	0.0788
2-Ton .....	26.3	39.0	0.0664
3-Ton .....	28.8	27.0	0.0607
5-Ton .....	28.9	26.5	0.0605

The averages were bettered to a large extent by the new comers to the show; most of the manufacturers who exhibited the year before changed but little in their design in the respect we are considering.

While I do not claim that conditions in this country are the same as those in France, I think it will do no harm to set down here by way of comparison the tractive factors which French engineers have considered the best suited for economical truck operation. I give below comparative figures which to me are very interesting in the light of the results obtained in the matters of mileage per gallon of fuel, and total tire mileage. These figures are averages of all but a few of the trucks which competed at the 1912 trials conducted by the French war office, and most of the trucks bear the names of firms celebrated throughout the world as masters in "construction automobile."

Size	Percentage of Average Load on Motor	Excess Motor Capacity	Tractive Factor
2 1/4-Ton .....	45.0	—19.0	0.390
3 1/2-Ton .....	47.0	—22.0	0.0373
5 1/2-Ton .....	48.0	—24.0	0.0356

These trucks will cover 11.7, 9.6 and 7.0 miles per gallon—performances certainly much better than those of our own trucks. It can hardly be claimed that these trucks lack power, either, for practically the same list of trucks entered the Russian war office trials, a short time after the French trials, and all were accepted as eligible for army service in Russia, the Russian government placing orders with every French firm which had a truck entered. From all reports, the trials were as gruelling as any which a motor truck ever entered.

English and French correspondents describe some of the runs in terms of almost horror—they had never driven from Detroit to Toledo during an April thaw. It may not be amiss here to mention the splendid performance of a White truck with a tank body which carried a supply of gasoline. This truck, according to an English correspondent, on several occasions did the apparently impossible in the way of getting through scandalous stretches of road, or lack thereof; and its oil consumption was so low that the Russian officer in charge called the observers together and cautioned them against any failure to report the giving out of supplies. It seems that the White truck had not been given any oil for two days and some of the sharp-eyed Teutons asked for an investigation.

As between the average tractive factors of

the trucks in this country, and those abroad, the figure I have given happens to stand about half-way, although it was not arrived at by means of averages. Having assumed certain things as my standards I made some experiments to check them, in accordance with the mode of procedure I mentioned early in this paper. These experiments confirmed, in a rather rough way, it is true, that my assumed tractive factor was on the safe side. The experiments were not confined to any one make of truck, or any one truck of a particular make. In some trucks substitutions of various parts were made for direct comparison. The trucks had all been in service from one to four years, all were of one type—double chains driven from a jack-shaft, and in most cases they were handled by the owners' drivers. As examples I shall give the results of two tests:

1—A truck carrying 3,000 lbs., driven by a 3x4 1/2 four-cylinder motor, tractive factor 0.040. This truck repeatedly mounted a 2 1/2 per cent grade over old, rough, water-soaked, wood-block pavement; and mounted a 3 1/4 per cent grade over a fair macadam pavement. The resistance factors overcome I estimated at not less than 0.0525 and 0.0300.

2—A truck carrying 5 1/2 tons, driven by a 4 1/2 x 4 1/2 four-cylinder motor, tractive factor 0.0286. This truck mounted a 3 per cent grade over a good brick pavement. Resistance factor estimated at 0.0400. With a greater gear reduction, gained by a change of jack-shaft sprockets, so as to give a tractive factor of 0.0336, this truck mounted a 3 1/4 per cent grade over a somewhat worn brick pavement; resistance factor estimated at 0.0475.

Here are discrepancies due to the lack of positive data covering essential points in the problem. Either the efficiency of the transmission systems considerably exceeded 70 per cent, or the motors developed unusually heavy torques, or the road resistances were less than indicated. All my experiments, however, indicated that motors of smaller average size than those now in use can be made to handle our trucks in a practical and economical manner, provided certain features are well carried out in design and construction.

At our meeting last summer David Ferguson, in discussing this subject, very rightly remarked, in effect, that the size of the motor must be chosen as the result of experience with a particular truck. Here, very likely, we may find the reason why some trucks have larger motors in proportion than others, and why a large majority of our trucks are burdened with so large a motor. Those particular trucks need the large motor—or their designers do not see how they can get along with a smaller one. The proper compromises have not been adopted, or data is lacking to warrant them in risking the production of an underpowered car. That underpowered bogey of the pleasure car designer must be overpowered before it has a chance to give a most promising young industry a further setback. The surrounding conditions here are different and must be dealt with in the light of different ideals.

#### Suggests Federal Tests

I have touched but on the outskirts of a large field for research: I hope, however, that what I have set forth will encourage those who have had similar ideas to my own, and some that individual or organization will undertake to map this field to the last square inch. It is properly a subject that should be taken up by our federal government. It deals with what will soon be a very vital part of the second most important activity of the country—transportation. Motor transport is destined, if properly developed, to effect vast economies for the entire population. Our roads are now the subject of a nation-wide movement for improvement. If these improvements are carried through, and there can be little doubt of it, the field for the motor truck will vastly increase. England, France and Germany pay large sums of money annually in subsidies to help develop their motor truck industries, because they realize their vast possibilities; and the technical schools, helped by the government, are carrying on experiments. We need similar help here only so far as data is concerned. Give us accurate information and our factories will make trucks that we can sell abroad in competition with their best, and supply our own vast industrial development with a cheaper and better tool for the conservation of human time and brute energy.

In summing up the contents of his paper, Cornelius T. Myers stated that the whole situation was in equating the resistance factor to the tractive factor at the point of ultimate attainment of the truck. That his formula was made up of figures taken on the safer side is shown by the fact that where his tractive factor was calculated at .0286, the same motor, measuring 4.5x4.5 inches, mounted a 3 per cent grade on a brick pavement with a

resistance factor of .01 or overcame a total resistance factor of .04.

He stated that his formula was assumed as to factors of tractive effort so as to reduce all motors on the same basis in the efficiency of transmission from motors to road wheels with double chain-drive trucks—the only kind considered in the paper—was 7 per cent and added that he believed this assumed efficiency to be too low, but it was that generally taken in designing trucks of this type. A. J. Slade, of the Atlantic Vehicle Co., discussed the need of more power in America on trucks, than would be required in Europe, and stated that at least 50 per cent greater power of motors was required to carry a given load here than abroad on account of the difference in road conditions.

#### Suggests Interchangeable Motors

J. A. Perkins, in comparing the widely varying conditions to be met in America with the more or less uniform requirements in Europe, stated that a motor which was suitable for one part of the country would be entirely inadequate to meet the requirements of another section. He suggested that motors of different sizes and horsepower be made with standard attachments to the chassis in order that motors would be interchangeable.

It was brought out also that the motor truck was essentially a vehicle of good roads, and that where road conditions were poor the motor truck could not be made to pay. The present motor is too large and we do not need bigger motors here than in Europe, and differing from Mr. Slade in this respect, Perkins prophesied that in a few years the motors will be the same size here as in Europe and stated that commercial vehicles are run faster here than in Europe, much too fast for economical operation.

R. L. Morgan announced that the practice abroad was to keep motors as small as possible, that the underpowered truck, like the underpower touring car, cannot attain great speed but will stand up. B. B. Bachmann stated that it was necessary to consider the demand if a motor designed for average conditions was to be put out by a truck manufacturer. In that respect it was necessary to have a motor which would have more power than necessary on good level roads, or small hills, and which would be somewhat underpowered on steep hills, and very rough country. The heavy motor worked against its own efficiency in that it meant heavier parts and hence actually required a higher power to carry it along.

Mr. Bachmann stated that he was a thorough believer in a small motor for commercial service; that economy was one of the most vital items, and that it was in direct ratio to the motor size; that the big motors were more expensive in the fuel used per ton-mile.

This precipitated a general discussion in which it was brought out that possibly the

reason for the employment of small motors in Europe was the question of economy, particularly since the cost of fuel over there was considerably greater than it is in America. It was also stated that the demand for trucks was restricted to local conditions, and that trucks could be built to meet more definite conditions, and be of less power than could those which were built to overcome such widely varying conditions of loads and service as are met with in America. Doubt was expressed that the proportions of motors obtained from Myers' formula would work in all parts of the country.

In rebuttal to this Myers stated that the relations of motors to truck size all go back to the question of weight, that the question was to obtain pounds of effort per pound of weight, that by his formula, all the various resistances, such as load resistance and so on encountered in service could be reduced to a total tractive resistance.

#### LOW-GRADE FUEL FOR MOTOR TRUCKS

By N. B. POPE

We are approaching a point where the stringency of the fuel market must become painfully evident to the motor vehicle user and indirectly to the motor vehicle manufacturer as well. Premonitory symptoms are 1—continued degradation of the gasoline of commerce; 2—increased prices for gasoline, which at present are tending in a mysterious manner toward a fairly uniform advance of nearly 90 per cent over the ruling wholesale rates of one year ago; 3—advances in the price of fuel oil east of the Rocky mountains, indicating in some measure the effect of rapidly increasing consumption for all petroleum products.

There is good reason to hope that the fuel difficulty may be relieved in large degree by co-operation between the automobile maker and the refiner, but the result of such co-operation cannot under the circumstances be realized for a period of months, possibly of several years. Its logical outcome would at best be an agreement on one or more standard grades of fuel of lower gravity and volatility than are common at present.

Meanwhile the commercial vehicle is rapidly becoming an important factor in increasing the total consumption of gasoline. Taking a rough average of all motor vehicles in use, one truck may be said to consume in the course of a year about three times as much gasoline as one pleasure car. Hence the great increase in commercial vehicle production must cause the motor truck to exert a preponderating influence on the fuel market as soon as the number of trucks in use exceeds one-third of the number of active pleasure cars. In a broad way, therefore, the introduction of low-grade and cheaper fuels for commercial vehicles should afford immediate and progressively increasing relief for the fuel market.

From the user's point of view the possible reduction in the cost of fuel is far from negligible. Using gasoline, the fuel cost represents at least 10 per cent of the total cost of operation. Usually it is more. Assuming that by the employment of low-grade fuels a saving of from 30 to 40 per cent of the fuel bill could be effected, and assuming the same consumption for the low-grade fuel as for gasoline, the substitution of the cheaper fuel would insure a minimum saving of 3 to 4 per cent in the total cost of operation. Unquestionably the overall saving should be even greater, and by careful development of special carburetors and slow-speed motors for the purpose it is probable that the inducement to the user can be considerably increased. Indeed, one maker on the Pacific coast, using engine distillate as fuel, claims a saving of 50 per cent on the fuel bill and a 20 per cent increase in power by doing away with gasoline.

#### Available Fuels for Trucks

As immediate substitutes for gasoline there are available: 1—kerosene; 2—distillate; 3—naphtha. Kerosene is exceedingly plentiful, low in cost, uniform in quality, promises to continue in abundance and, if demanded in large quantities for motor fuel, could be disposed of in the domestic market with greater profit to the refiner than when marketed abroad, as is so largely done at present.

Engine distillate is a product obtained from the western crude oils after the lighter fractions have been distilled off, and, in a way, is analogous to kerosene in respect to its posi-

tion in the scale of petroleum derivatives. It is less thoroughly refined, however, and at present is to be considered principally as a local product. That its practical equivalent could be produced from other asphaltic oils, such as those of Texas and Mexico, I believe to be the case.

"Naphtha" is as indefinite a term as "gasoline." In its present use it is intended to embrace not only the heavier fractions that commonly are included with the gasoline distillation, but also the fractions between gasoline and kerosene, which are at present lost to the automobile fuel market. Being slightly more volatile than kerosene and moreover free from the doubtful reputation that kerosene enjoys as a fuel, it should prove easier to introduce, first, because the user is in no wise prejudiced against it, and second, because its employment entails less experimental development.

In considering the comparative utility of different fuels, particularly as between gasoline and the lower-grade petroleum distillates, there is little question of thermal equivalents. Whatever difference exists is, if anything, in favor of the heavier products. Volatility, however, as expressing the ease with which the mixture may be generated, is of paramount importance. Volatility, viscosity and gravity together indicate the comparative facility with which a fuel can be reduced to the condition of a dry or wet mixture and so delivered to the engine.

#### Carburetion of Lower Grade Fuels

In considering the lower-grade fuels it is necessary thus to distinguish between the carburetability and combustibility. That a liquid cannot be carburetted by ordinary methods need not condemn it for use in the internal combustion engine, but it does exclude it from consideration as a fuel for automobiles of present construction. In this way it is perfectly true that the carburetor is really the determining factor in fuel selection. As the values of volatility, viscosity and gravity are lowered the fuel becomes, respectively harder to vaporize, more difficult to force through small orifices—having a higher coefficient of discharge—and requires a greater lifting effect to overcome its superior mass per unit of volume. With the heavier fuels, therefore, different proportions must be employed in the carburetor in order to obtain results corresponding to those obtained in successful instruments designed for gasoline.

The quantitative expression for the relation of these all-important area and velocity relations is still locked in the designer's breast, but it is evident at least that a carburetor designed for heavy fuel may be more satisfactorily operated with gasoline than a gasoline carburetor with heavier fuel. To assist in the vaporization of the lower-grade fuels more heat is necessary than for gasoline. This is due largely to the fact that the latent heat of the heavier fuels is greater than that of gasoline. With the lighter fuels, such, for example, as 76 degrees gasoline, a larger proportion of the fuel may be vaporized completely before the mixture reaches the cylinders. With the heavier fuels, on the other hand, most of the fuel reaches the cylinders in atomized liquid form.

The application of heat to assist the vaporizing action may be continued profitably only up to the point where volumetric efficiency is affected adversely. So long as the heat supplied to the mixture is absorbed in raising the temperature of the liquid particles, or in vaporizing the fuel, the volumetric efficiency will not be reduced, since the temperature of the mixture will not be raised; but the partial insulation of the liquid by the surrounding medium of air and fuel vapor prevents a free interchange of heat, particularly in view of the high velocities involved. For this reason the quantity of heat that can be supplied is less than that required to bring even the lighter fractions to the boiling point and convert them into vapor.

That a certain loss of volumetric efficiency can be employed profitably as an offset to the non-homogeneous and consequently slow-burning mixtures that otherwise would result is, however, probable. The law of compromise will stand considerable investigation in this respect.

High velocities likewise, while tending to promote evaporation by mechanical action on the liquid particles, can be employed only to the limiting point where the volume of the charge is reduced by excessive fluid friction. Practically speaking, both methods must be used in combination. In any case, however, it must be borne in mind that the bulk of the vaporizing process with the heavier fuels must be carried on within the cylinder during the compression period.

The design of the heavy-fuel instrument, therefore, must be postulated on the theory that it will handle at all times a wet mixture, and due provision must be made against the separation of the liquid compound by baffling surfaces. Furthermore, since a certain amount of separation must occur from this cause, with consequent tendency to loading of the mixture under certain running conditions, its effect must be minimized as far as possible by pro-



viding ample heating for all critical points in the manifolds and ports.

#### Starting on Kerosene

However successfully a carburetor for low-grade fuels may be made to function under normal running conditions, starting will be rendered difficult in just the degree that normal operation is dependent on heat supplied. Of the two available methods of counteracting this difficulty—one the supplying of artificial heat prior to starting and the other the use of a more volatile fuel for the first few charges—the latter is by far the simpler and easier to accomplish. Where normal carburetion is dependent largely on high velocities to convey the mixture to the cylinders, starting the motor when cold is accomplished more easily. Ease of starting thus becomes, as it were, inversely proportional to the normal heating-effect and directly proportional to the normal velocity-effect under running conditions. Hence it is reasonable to conclude that a mechanical starting device will always be required for low-grade fuel motors, and that in addition either the use of a high grade fuel for the first few moments of operation will be necessary, or else a method of priming. In many respects the latter method is preferable, especially if acetylene be used, since it permits starting without special carburetor adjustment (other than choking of the air), simplifies bi-fuel tank and piping complication, and further introduces into the primary charges a high-velocity combustible which serves as kindling material for what is practically a normal charge.

There is every reason to believe that in the natural course of events engine-starting appliances will soon become a practical necessity on all motor vehicles, so that the development of such devices for commercial vehicles in connection with the adoption of low-grade fuels need not be viewed in the light of a special and purely incidental burden. Practically speaking, starters are more necessary on commercial vehicles than on pleasure cars, through their economic advantage in conserving the driver's energy and because they permit the shutting down of the engine for all loading stops, whether long or short.

#### Combustion of the Fuel

On combustion the lower-grade fuels, containing as they do larger proportions of unsaturated hydrocarbons, give rise to more complex reactions than the higher-grade fuels, with consequent tendencies to the deposition of free carbon. Due to the complicated nature of the process, and on the hypothesis that certain of the reactions must proceed in sequence, flame propagation is less rapid with the heavier hydrocarbon, even with homogeneous mixtures that are properly proportioned. With incompletely vaporized mixtures, or those which are not agitated during the compression stroke and which in consequence may be described as in a "lumpy" condition, combustion will be further delayed by the completion of the mixing process as a result of the agitation of the flame waves. Because of this double retarding influence, slow combustion almost invariably accompanies the use of the lower-grade fuels, which are in consequence suitable for slow-speed motors only, so long as carbureting methods approximating those at present in use are retained. As the slow-speed engine is well adapted in other respects for commercial vehicle use, however, it follows inversely that the heavier fuels are particularly adaptable to commercial vehicle purposes.

As a large proportion of commercial vehicle types may be said more truly to be in the early stages of evolution than are pleasure vehicles, it follows that the adaptation of special apparatus for handling low-grade fuels will work less hardship on the truck manufacturer than it would if forced on the builder of established types of pleasure vehicles. Further, the higher valuation placed on operating economy by the commercial vehicle purchaser must tend to render the kerosene or naphtha-burning machine a more acceptable offering in that field than a pleasure car possessing the same features would be in its field. Indeed, were it possible to offer almost any large truck user a carburetor that would handle a low-grade fuel as efficiently as his present carburetor handles gasoline, there is little question that he would accept the substitute immediately, on the basis of a not unreasonable performance guarantee for the lower-grade fuel.

#### Need of Popular Education

It will be objected that so long as the commercial vehicle user sees countless pleasure cars operated on gasoline, he will continue to be skeptical about the need or advantage of changing to a substitute fuel—even in the face of high and continually rising prices for gasoline; which is largely true. Above all things, there is need that motor vehicle users of every class be taught to discriminate in the matter of fuels—that they be taught that it is possible to offset rising gasoline prices by the adoption of lower-grade substitutes, and not improbably in the future by the adoption of manufactured fuels derived from various sources. The bondage of the automobile industry to petroleum is largely traditional. Petroleum products must be employed exclusively as fuel only so long as

they are cheaper than other fuels. As a matter of self-protection the automobile manufacturer should assist in spreading this truth.

Granted the possibility of adopting a fair working standard for motor fuels, introducing one or more low-cost substitutes for gasoline, such an educational program could be readily put under way. Otherwise the process must be slower and more difficult. Let one or two successful manufacturers exploit models specifically intended for low-grade fuels, however, and the movement will be well inaugurated. What one small concern in its isolated territory west of the Rockies has done from the very beginning of its career, other and better equipped makers can do without fear of failure, and without risking a staggering capital investment. Once the movement is really started and the truck user learns that he can reduce materially his outlay for fuel without sacrifice of serviceability, the battle will be more than half won. And when the pregnancy of the present fuel situation is fully understood, the strategic advantage of such a development can be well appreciated.

The discussion on the question of fuel for commercial vehicles brought out the fact that there were a number of motors running on low-grade fuel. One was mentioned which has operated ever since it was manufactured on nothing else but the low-grade fuel. While discussion was in progress on this paper, R. L. Morgan stated that he had observed a carburetor in which an electric coil was placed in a passage below the venturi tube and which permitted the motor to start on the low-grade fuel 20 seconds after this coil had been switched in.

The discussion on this paper reflected back on Mr. Myers' paper and brought out the fact that very few of the truck manufacturers, if any, had gone into the matter with a formula. Another point which was brought out was that the fuel consumption was of such importance that it was necessary to cut the motor size to the utmost limit. The author of the paper in speaking of this phase of the situation after having read the paper stated:

"The weight of the motor increases proportionately with its power, we therefore not only have an added power which is necessary but also an added weight which renders it still more necessary to carry excess power."

#### TENDENCY OF FOREIGN MOTOR TRUCK DESIGN

By L. C. FREEMAN

Chief Engineer, Federal Motor Truck Co.  
It might as well be admitted in the beginning that the data presented in this paper do not justify the use of its comprehensive title, which was selected in sheer desperation after a futile search for one more expressive of the true character of the text. It is simply an attempt to set forth some of the details of design which are most interesting, together with some comments on their advantages and disadvantages, as they appeared to the writer in a recent trip abroad.

A composite picture of the predominant English motor trucks would show the motor under a hood in front of the seat as in conventional pleasure car practice; a cast-tank built-up radiator in front of the motor; right-hand drive; fixed-spark magneto ignition; thermosiphon cooling; three-speed transmission; cast steel plain-bearing wheels; rear springs taking both drive and torque; both brakes on rear wheels, and worm, pinion or chain final drive. No one particular make embodies all these features, but they represent the writer's impression of the English truck, crystallized from information obtained and observations made.

#### Radiators in Europe

There seems to have been a nearly universal and simultaneous adoption of the cast-tank built-up type of radiator. The top and bottom tanks are made for the most part of aluminum, the top tank being in some cases ribbed to secure increased radiating surface. The radiator seems to have the following points in its favor: It has very few soldered joints as compared with the "tin case" type, as the Englishmen call it, and the joints are stressed very little or not at all, as any forces acting on the radia-

tor are transmitted through the side bars to the comparatively rigid tanks, and as long as there is no movement of the bolted joints or deflection of the tanks and side bars, the soldered joints cannot be stressed except by the action of inertia forces set up by the core itself. The filler and inlet and outlet connections may all be cast on the tanks if desired, while the side bars may be designed easily for practically any form of support. Hood ledges may be cast on, thus doing away with the trouble caused by relative movement of the hood and radiator cutting the sheet metal ledge. The core may be of any type whatsoever, either cellular or vertical tube; the latter either with or without fins as the individual designer may prefer.

It would seem that cast iron could be substituted successfully for aluminum if the percentage of efficiency per pound of weight were not considered important. The weight and cost of an aluminum-cast-tank radiator should not exceed greatly that of the usual type of the same capacity and efficiency. The greatest advantage, however, would be to the user. The cores can be made strictly interchangeable if master spacers are used in assembling, and as the cost of the core, which is the only part ordinarily liable to damage through accident, will be about 50 per cent of the total cost of the radiator, the user's repair bills due to accidents to this part of his car will be cut exactly in half. The fact that an ordinary wooden block seems to make a sufficiently flexible support is eloquent testimony of either the strength of the radiators or the excellence of the roads in England.

#### Brakes Are Two-Handed Affairs

Brake hand-levers are big two-handed affairs that look as though they were really to be used for braking and not merely as locks to hold the car when standing still. There seems to be a marked tendency to place both service and emergency brakes on the rear wheel hubs, which I believe was originally a purely American construction. All brakes noted were practically without exception of the internal-expanding type with metal-to-metal and lined shoes apparently in about equal favor. The brakes were in most cases cam-expanded and usually equalized, some of the mechanisms to accomplish this being very ingenious.

#### Cast Steel Wheels Tried

Plain floating wheel bushings seem to be perfectly satisfactory, with low first cost, non-adjustability and cheapness of replacement as big points in their favor. Some have hardened sleeves in both the wheel hub and on the axle, while on others the bushing rotates on the soft axle. There are several different methods of lubricating, all of which seem to work very well and apparently considerable variation in design is allowable without materially affecting the service obtained.

While cast steel wheels seem to give very good results under certain conditions, they do not appear to be a universal panacea for all wheel troubles. One user who has operated a great many trucks of many different makes said that cast steel wheels were all right until the tires wore thin. In this statement I think there is food for a great deal of thought. A built-up wheel of structural steel was giving him excellent service and almost no trouble.

The usual mounting of the chassis is on four semi-elliptic springs, although some cases of three-quarter fronts and semi-elliptic rears were noted. French designers seem to favor wider springs, the average being 25 per cent wider than on the English cars of the same capacity.

#### Springs Take Torque and Drive

The most interesting point is, however, that both torque and drive are taken through the rear springs, with evident success. There is possibly a little more trouble with the springs, but none at all with radius and torque rods and their attendant fittings. It has evidently been found that the maintenance cost of a Hotchkiss-drive truck is less than of one with radius or torque rods or both; the first cost is certainly less. This is the true test of the worth of a design—does it make the total cost of operation minimum? In the case of one truck noted it was a question as to how the torque was taken, as the long reinforced-wood radius rod flexed so much under load that the springs must have taken some of it.

An interesting commentary on the favorable conditions for motor truck operation abroad is that a pleasure car chassis with a van body seems to make a perfectly good truck with a capacity of about one ton for retail delivery. The opinion was advanced in some quarters that the three-wheeler is the solution of the problem of satisfactorily and economically replacing one horse with a motor vehicle. It is a question, though, whether it could be operated at a lower cost than a certain-priced American car, when "operated" is taken to mean the entire cost of the service.

#### Motor Starters in France

In London there does not seem to be much attention paid to motor starters, and less still in Paris. In both cities traffic is about as badly congested as could be imagined, and it would seem that if motor starters were worth

while at all, such a condition would hasten their adoption. The answer probably is that more is lost than gained by their installation.

In regard to the final drive, there seems to be more unanimity of opinion than there is in this country. In England the worm has a shade the better of the argument at present, but is not gaining ground very rapidly; while in France, judging from the exhibits at the Paris show, it is not considered seriously. One of the advantages of the worm drive is, of course, quietness, but the pinion-drive Schneider buses in Paris are certainly as quiet as could be asked.

#### Final Drive Still in Development

Any one of the four types of final drive which are at the present time considered as possibilities, undoubtedly has certain points of superiority over any or all of the others, but is also subject to troubles which are peculiar to it and not found in the others. When all the good and bad points of each are balanced, it will be found, everything considered, that no one of them is from the user's point of view so very much superior to the others. This was borne out by the things the writer saw in the different repair depots and garages which he visited and by the statements of the men with whom he talked. Each, of course, had formed his own opinion from experience with the various types, but the opinions and experiences were by no means uniform. Thus, of four different men interviewed, each of whom had had about the same amount of experience with the different types but under different conditions, one pronounced the chain drive to be still the most satisfactory; another was very enthusiastic about the worm; the third was best satisfied with the results he had obtained from the pinion drive; while the fourth was very strongly impressed with the possibilities of double reduction.

So, while beyond question fairly good and consistent results can be obtained with any of the types, it seems that no one has yet been developed to the point where it is all roses and no thorns, and that considerations other than those of a strictly engineering or technical nature will in the immediate future largely influence the choice of the type of final drive in new designs. Ultimately, of course, the design which will give the greatest number of users the maximum of service for the minimum cost will be the one to survive. For the time being the buying public may give really non-essential factors an unduly large valuation and thus divert design from the path plainly marked by economical considerations.

Several of the members present commented on the stand taken by the French and English war offices in subsidizing motor trucks. The fact that the English war office has subsidized only the bevel drive while the French war office refuses to subsidize the bevel drive was especially noted.

The last paper to be presented at the session was a discussion of truck tires by B. B. Bachman, assistant engineer the Autocar Co. The paper was entitled "Comparative Results with Solid and Pneumatic Tires on Light Commercial Vehicles." Bachman stated that his paper was a summary of results on one make of truck of 3,000 pounds capacity. These showed that the comparative cost per mile with solid tires against pneumatic tires was 3 cents a mile for the solid and 5 cents per mile for the pneumatic. When the car maintenance as a whole was considered it was found the cost was nearly 50 per cent greater for the solid tire as compared with the pneumatic, and that there was a 30 per cent saving of gasoline in favor of the pneumatic tired trucks. In fact, in all except tire cost alone the figures were all in favor of the pneumatic.

Bachman completed his remarks by stating that the pneumatic tire for truck service has been given a black eye by most users on account of the very general undertiring of trucks and excessively high speeds at which they are operated.

In the discussion of this paper C. T.

Myer suggested that the proper tire equipment, and particularly the trouble with the pneumatic to date, was a question of two things. First, that the tire inflation pressure generally employed is not sufficient, that greater tire pressure is needed for the same size of tire in commercial vehicle service than is used for pleasure cars. Tests on factory trucks showed an increase of tire cost with pneumatics, but a lower maintenance cost. It was brought out that as far as engine cost was concerned the balance was in favor of the pneumatic tire on smaller trucks which were run at fairly high speeds. The vibration of the motor truck was stated to be its one weak point and in the lighter vehicles where the cost of pneumatic tires would not be beyond reason, they were in the long run more economical.

A. J. Slade inquired as to whether there were any cushion tires which were interchangeable with the present solid tires for motor trucks. This was followed by a statement that shortly one company was to put out cushion tires which could replace the solid, and was followed by expressions of widely varying opinions as to the relative efficiency and economy of the cushion and filled tires versus the solid tires.

#### Discussion of Worm Gears

The discussion was then turned over to the subject of worm gears. Henry Souther, who had made a study of this subject while on the recent trip abroad of the Society of Automobile Engineers, stated that while the manufacturers were not in agreement as to the specific composition of the worm and gear they did agree that the best results were obtained from hardened steel against bronze, the steel being the worm member of course. In some cases, he stated, where the bronze was not of the proper composition, it had been known to flow under the pressure of the worm, so that the bronze must be such composition as to resist peening. He also added that worm gearing as a whole required very careful machining and handling to obtain satisfactory results, and that the only disadvantage of the straight worm over the hourglass type is the lessened road clearance provided when the worm is under the axle.

Frank Burgess, of the Boston Gear Works, stated that worm driving had proven successful in Europe and that it was being developed here; that the issue could not be pushed, but the adoption of worm drive was a question of time. It must be given a chance to grow. Burgess stated his belief that contrary to present practice, a worm gear would be employed most extensively on trucks. He stated that simplicity was an issue, and that for success a device must have as few parts as possible with the minimum number of bearings, but that so far as worm gears were concerned, it was only a matter of cutting the worm teeth cor-

rectly and that they required the development of special machinery.

At present the engineers have not had time to develop this phase properly. He stated that the Hindley shape of tooth will make a successful worm, that the nearer you get to the flat tooth the better efficiency will be obtained, the better lubrication, longer wearing qualities and less heat will be found.

C. T. Myers said that it must be remembered that the commercial vehicle industry is not the same as the pleasure car field, that designers must not go too fast but must work for a simple design of vehicle. He stated that worm drive was less simple than the chain drive and had the disadvantage of increasing the unsprung weight on the rear axle. He concluded by saying that the new ideas are good and that engineers should sit down and think about them but go slowly in their adoption.

T. V. Buckwalter, of the Pennsylvania railroad, then made the remark in referring back to the several references to different formulas throughout the discussions of the evening that it was impossible to accomplish anything practical by the mere use of a formula. President Alden, in replying to this, stated that a formula was necessary in order to make a start, and that it would be nearly blind work to attempt to proceed without one.

#### Engine Starters for Trucks

The discussion on starters for motor trucks was opened. R. L. Morgan stated that in his belief it was best to leave off the starter because if he hired men husky enough to handle freight and found that they were too lazy to turn over the motor, he would get rid of the men. He also stated that on the truck, simplicity was the biggest feature of design. Every part which could be left off without affecting the efficiency of the truck was so much gained. This was, in his opinion, especially the case where the larger trucks were concerned.

There is not the need of economy of time in motor starting on the smaller sizes that there is in the larger sizes of trucks because the nonproductive investment during the time the truck is idle, is not so great in the smaller sizes. Mr. Cohan remarked that one reason the electric truck is supreme in certain fields is it is easily started, and said that when the gasoline truck becomes easy starting it will encroach on the field of the electric. He went on to say that huskies do not make the best drivers, and that the driver that is torn between duty in saving gasoline for his employer and letting the engine run to save his elbow is quite likely to take the latter alternative unless the motor is equipped with a starter. C. T. Myers added that he had found starters not desirable and not in great demand for vehicles over 1-ton capacity.

A general discussion then followed on simplicity of motor trucks. It seemed



to be the general opinion of the members who entered into the discussion that simplicity should be a cardinal factor of motor trucks.

#### Metal Wheels Discussed

The discussion of the subject of metal wheels evolved a wide variance of opinion among the truck makers and engineers present. Lee S. Bowers, of the Schwarz Wheel Co., stated that it was his belief that the metal wheel is utterly rigid, non-resilient and hence devoid of the capability to absorb road shocks.

It was stated by R. L. Morgan that wood wheels used on trucks were found in many cases to be from  $\frac{1}{8}$  to  $\frac{1}{4}$  inches out of round, while the metal wheels would stay true; that the manufacturer of wood wheels has not developed with the truck industry and that the great weight on them caused many of the wheels to fail. Mr. Bowers responded to Mr. Morgan's criticisms by saying that wood wheels were now manufactured which remained perfectly true, and which gave excellent service in as much as they possess resiliency, and thereby absorbed the road shocks and cut down to a remarkable degree the cost of upkeep on the entire car.

Following discussions brought out the fact that the members were in agreement in stating that excess weight must be guarded against. Some agreed that they had broken more axles with solid wheels than with the wood wheels, while others claimed that owing to bad wooden wheel construction the life of the tire was shortened on the latter type. The difficulty of securing light castings was also mentioned. It was the belief of some that the cast steel wheel would supersede the wood wheel in time in as much as cast steel wheels can be made if the same material is employed as is used in making wheels for railroad cars. It was also stated that it has been shown that traction engines need metal wheels and that at the present time probably are the only vehicles that do need them.

### Exhaust Gas Analysis Method of Diagnosing Motor's Condition by Waste Products Outlined by A. C. A. Expert

NEW YORK, Jan. 18—The topic of exhaust gas analysis which was discussed at the Friday afternoon session of the S. A. E. proved to be one of the best attended and most interesting of the week. A number of authorities on the subject were on hand to expound their ideas and experience, which in several instances has extended over a long period. Dr. Arthur H. Elliott was scheduled to present a paper on the analysis of exhaust gases but owing to illness was unable to prepare any material or to be present to aid in the discussion. The analysis of the exhaust gas of a motor is becoming to be looked upon by many engineers of long experience in testing

work as necessary to the proper determination of the efficiency of the engine under test. By means of data as to constituents of the waste gases the engineer is able to determine whether or not the motor is getting all of the useful energy and power out of the mixture.

In the absence of Dr. Elliott several notes on the subject were hastily prepared by Herbert Chase, Laboratory Engineer of the Automobile Club of America, who dealt with the subject in its relation to carburetor and engine testing. Mr. Chase said:

Some of you will doubtless recall that I gave you in the paper which I read before the society at its last summer meeting some data which I had obtained along this line in testing a six-cylinder Pierce motor. Since that time I have conducted a considerable number of tests in which samples of the exhaust gas were taken and analyzed. I am now convinced that I was correct in the impression stated in this paper that a much more satisfactory method of taking the samples of exhaust gas could be employed than the one there outlined. We now use a method which gives much more consistent and satisfactory results for reasons which I will shortly point out.

It has been our practice to make tests along very much the same lines as indicated by Mr. Heinze in his discussion of motor testing, although the methods which we employ differ somewhat in detail. In addition to measuring the air and the gasoline which enter the motor, we also analyzed samples of the exhaust gas for the following reasons:

Measurement of the air and the gasoline make it possible to determine whether or not the proportion of each remains constant. Aside from this, one very important factor remains to be determined, namely, is the gasoline properly mixed with the air in such manner that each molecule of oxygen and hydrogen will come into contact with a molecule of oxygen during the very short period of time when effective combustion takes place? It may be argued that this question will be answered by measuring the horsepower at the same time that the air and gasoline are measured and concluding that a better diffusion of the gasoline in the air is obtained, when, as a result of some change in the method of spraying without changing the proportion of air to gasoline the power increases. This process can be followed with reasonable satisfaction up to a certain point, but when is the investigator to know whether or not still better results could be obtained until he has determined as to the completeness of combustion?

There are other arguments in favor of analyzing the exhaust gases. One is the convenience and simplicity of the determination, but means for measuring the air are not at hand. In road testing it is quite easy to make samples of exhaust gas for later analysis, whereas air measurements would be exceedingly difficult, if not impossible.

With the price of fuel rapidly increasing it now becomes more important than ever to get the greatest possible amount of power out of the given amount of fuel. I am very decidedly of the opinion that this object could be obtained more readily if engineers would give more consideration to exhaust gas analysis.

I may say also that Prof. Watson, an English investigator of considerable prominence, has found in some of his investigations that the maximum power of a motor is obtained with a ratio of air to gas from twelve to fifteen by weight. He has also determined that the maximum thermal efficiency corresponds to about seventeen parts of air to one of gasoline. Other investigators state that about fourteen parts of air to one of gasoline, which is approximately the theoretical amount necessary for complete combustion, gives the best thermal efficiency.

The discussion of the subject was opened by E. R. Hewitt, who has had wide and varied experience along this line. He outlined the apparatus which he uses in making running tests, and explained the method of attachment to the car. The necessity for rapid collection of the sample of gas to be tested was emphasized. It was also brought out that results obtained by road tests are not the same as those under brake-test conditions. The reasons which Mr. Hewitt gave for this difference are that the jar of the motor on the road

affects the carburetor float level and also the variation in temperature under the hood has a bearing on the results obtained. He stated that there was a difference of 15 per cent to 100 degrees Fahrenheit variation in temperature. For greatest efficiency on the brake as well as on the road Mr. Hewitt has determined the following exhaust analysis:

13.5 per cent.....	CO <sub>2</sub>
0.1 per cent.....	O
0.2 to 0.3 per cent.....	CO

Whenever an analysis of the exhaust gases does not check up as would be naturally expected, the deviation from the normal conditions may be ascribed to poor carburetion. The normal analysis should show intimate mixture and complete combustion. Mr. Hewitt touched upon tendencies for condensation within the manifold. With any carburetor whatever, with velocities in this carburetor below 5,000 feet per minute, it is impossible to get away from condensation within the manifold. We begin to get good results at 8,000 feet per minute, and best results are obtained at a speed around 15,000 feet per minute. The problem in carburetor design is therefore to get this result with the least expenditure of power. Mr. Hewitt has determined that the maximum efficiency mixture has approximately the following composition:

12.5 per cent.....	CO <sub>2</sub>
2.0 per cent.....	O
0.0 per cent.....	CO

Mr. Hewitt has made a number of tests with a view of determining the effect of the action in the intake, both on the power developed and on the mixture. He has found that 1 inch mercury suction affects the power about 10 per cent, which relation holds up to 3 inches of mercury, so that if it were possible to reduce the suction to zero, we would get an increase in power of about 30 per cent.

J. M. Breitenbach gave it has his opinion that another reason for power loss in motors designed according to American practice is that the explosion chambers are too large and that another is on account of incorrect timing.

#### Marshall's CO<sub>2</sub> Test

Prof. W. C. Marshall, Sheffield Scientific School, Yale University, added some most interesting points to the information already given out, his ideas coming as a result of a number of road tests made under varying conditions of speed and with different types of motors, during the past summer. In his experience he has found that under road conditions the analyses compare very closely with those given by Mr. Hewitt. He pointed out that from the amount of CO<sub>2</sub> which is present in the waste gases is a very correct indication of the fuel consumption of the motor. For instance, when from 5 to 6 per cent CO<sub>2</sub> is found, the car averages from 4 to 5 miles on a gallon of fuel, while when the exhaust shows 12 to 13 per cent CO<sub>2</sub> the economy runs up to three or four times as much.

Looking at the practical side of the

problem, Prof. Marshall stated that an exhaust gas analysis as applicable to motor car engineering is not so difficult as to cause any engineering department to hesitate to make them. Determination of the composition of the waste gases not only affords a means of gauging the economy of the motor, but also makes it possible to arrive at the relative efficiency of carbureters.

Mr. Hewitt, in reply to a question as to what engines he used for his tests, stated that he had employed two machines for the purpose, one a four- and the other a six-cylinder model. The cylinder dimensions of these two motors are the same, being 4 by 4.75 inches. He averages from 21 to 24 miles per gallon with the four-cylinder type and 14.5 to 15 miles per gallon with the six.

#### Variables Reduce Value

W. G. Wall, chief engineer of the National company, stated that he has made a number of exhaust tests during the last 28 years, and that, due to the many variables such as the size of the intake, the shape of the ports, and so on, he has come to the conclusion that gas analyses are of very little value. When very best theoretical results are obtained, they are of little use from the practical side. He has been unable to arrive at any definite conclusion of this method of motor testing due to the many contradictory results.

E. J. Stoddard, a patent attorney, touched upon the chemical manipulation in connection with accurate analysis. Engineers are somewhat weak on this phase of the subject, he said. He inquired as to whether the absorption of oxygen is liable to produce CO in itself. The reply was negative.

Mr. Hewitt was requested to outline briefly his method of procedure in making exhaust analysis. The CO<sub>2</sub> is absorbed first, after which the oxygen is removed, which leaves only the CO. In discussing carbureters in this connection Mr. Hewitt stated that he has tested in all about thirty types, and that the analysis does not depend upon this feature. One carbureter will work well at one particular range of speed and may be very poor at a lower or higher range. There is no carbureter at present which works equally well at all speeds. In the average case, the carbureter is adjusted for too rich a mixture at all times. This is due to the fact that it is impossible to compensate for differences in temperature under the bonnet so that if an instrument is adjusted for best running at a good speed, it is very poor for starting purposes. Dash carbureter adjustment for manually changing the mixture in accordance with these varying conditions is therefore necessary.

T. S. Kemble, of the Peerless experimental laboratory, believes that horsepower and other block tests are equally as good for arriving at the efficiency of motors and for deductions as are an analysis of the exhaust.

In closing the discussion, Herbert Chase mentioned the point of dissociation and recombination which had been brought up earlier as a possible theory as to the action of the gases in burning. He stated that the society would be authoritatively informed on this point later.

## Is Magneto Threatened?

### Discussion of Effect of New Electric Systems—Pleads for 42-Inch Wheel

NEW YORK, Jan. 13.—The meeting of the professional session of the S. A. E. convened Saturday morning and the first topic for discussion was "Whether the magneto as at present fitted was likely to be discarded owing to the adoption in some quarters of the motor starter, lighting plant and ignition contained in one unit." Mr. A. L. McMurtry, of the Aristos Co., opened the discussion and stated that the high-tension magneto, as at present used, was a most reliable instrument. When the question of a combined system of starting, lighting and ignition was considered, the element of security was not so great as in the present magneto. It only required a short circuit anywhere in the various leads to render the ignition system useless.

A. L. Riker, of the Locomobile company, thought that it was a question to determine whether the same result could be obtained with the one-unit as well as with the three-unit? Further, if the result was the same, what the relation would be in point of view of first cost? He thought that a combined unit would cost less, but the relative weights and space occupied were also points that would have to be considered.

E. V. Hartford, president Hartford Suspension Co., agreed with Mr. McMurtry that it was better to leave the high-tension magneto and continue to use it in addition to the other electrical equipment employed for starting and lighting.

#### Improved Wiring Needed

Professor Hutton said that he had had some experience with this situation and had experimented with two batteries, but owing to the lack of standard in wiring he was troubled continually with short circuits. Until the methods of wiring were improved he thought that the present plan was the better. A possible solution was the motor and generator combined and the outcome of experiments along this line might be satisfactory. In the speaker's mind there was a doubt and the question resolved itself as to whether it was desirable to attack the effectiveness of the motor in any way.

Mr. V. G. Apple, manager of the Apple Electric Co., believed that for commercial reasons that it was better to continue to use the magneto for ignition purposes. He advocated taking the current from the battery for starting purposes only. McMurtry pointed out that the

Bosch company has brought out a small magneto to be fitted on the dash for starting purposes, thereby doing away with the battery. He thought that there must have been a reason for this, and went on to state that it simplified the system considerably as the batteries had other duties to perform.

H. L. Pope stated that in his opinion it was best to leave the magneto alone, for the present at any rate. He thought, however, that the time would soon come when the various systems would be combined. There would be a saving of weight and less initial expense also. Howard Marmon stated that it had taken a number of years to develop the magneto to its present reliable state, and one advantage of the magneto was that as the speed of the motor was increased, the intensity of the spark increased also. This fact simplified control. President Alden said that no doubt that it would be the survival of the fittest in the long run.

The next topic for discussion was "Why has the 42-inch wheel been discarded?" President Alden said that it was not so much a question of the 42-inch wheel being discarded as that it had failed to grow in favor and he called upon the several members present to give their opinions upon the matter.

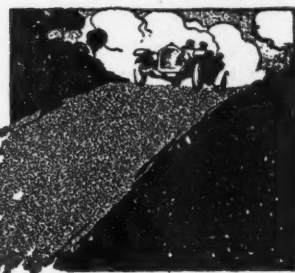
A. L. Riker pointed out that the majority of Americans wanted to carry three people on the rear seat and to do this it was necessary to have an overall width of 57 to 58 inches. The public also wanted to be as near the ground as possible. With a 42-inch wheel, 57-inch tread and the body width of 57 inches the tendency of the larger wheel design was to perch people high up in the air. Then there was the question of the additional cost of the tires and he did not think that the advantages gained by the large wheel were in proportion with the extra cost entailed. In order to hang the body low and use large wheels it was not feasible without increasing the tread and he did not think that this was a move in the right direction.

#### High Wheels Break Axles

Mr. McMurtry said that he had built a horseless carriage in 1897 to which he fitted large wheels and experienced considerable trouble from broken axles and broken steering spindles. The size of the wheels was originally 40 inches and upon reducing the size of the wheel to 30 inches the axle trouble disappeared. Professor Hutton pointed out that the increased diameter of the wheels gave a longer lever arm to the body and that heavier brakes would be necessary. It was a question in his mind whether or not the better riding qualities were imaginary. President Alden stated that he had ridden in several cars with large wheels and with smaller ones under the same condition and he had experienced more comfort with the large wheels.



# Routes and Touring Information



VERY good roads and very bad roads designate the only two classes into which the highways of Louisiana are divided. Touring in a motor car consequently is likely to be a pleasure of the sterner sort. A pulley and tackle, half a dozen 4-foot boards and a supply of blocks form a portion of the equipment of the wise driver who expects to see something of rural Louisiana. Some hardships must be expected, but they are far overbalanced by the charm of the scenery and the quaint beauty of the farms and villages.

## Customs of the Natives

Away from the railways and off the beaten roads of the Pelican state there is

## Motor Touring Possibilities of Louisiana



IMPROVED ROAD MILEAGE IS INCREASING IN LOUISIANA

By Paul Wooton

a foreign air. The descendants of the Arcadians and of the early Spanish and French colonists have kept clear of the melting pot. They have not been Americanized, while the passing centuries have converted them into sturdier stock, much changed in their ways and customs from their ancestors. Their language no longer is French. A Parisian or even a Creole from New Orleans must resort to English if he is understood. Holland has few characteristics that cannot be duplicated in the rice country. Features of interest exist in endless variety, which combined with the splendid hospitality of the country folk, repays the tourist for the times he gets his feet muddy.

Tours generally are governed to a great extent by the season. If the rainfall has been heavy those who venture far from the improved roads are likely to come to grief. When, however, there is a sea-

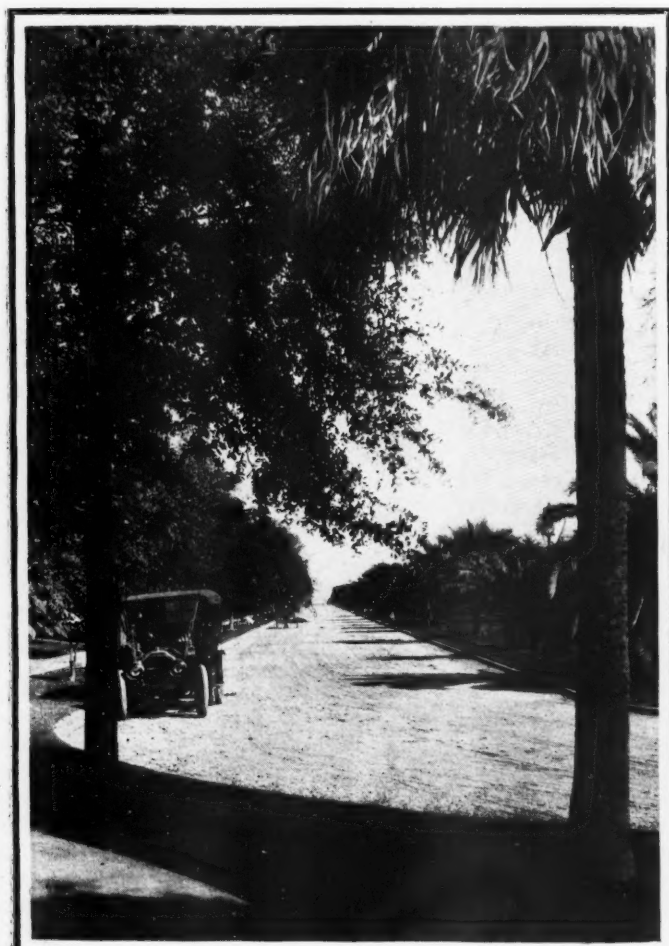
son such as the summer and fall of 1912, with a minimum of precipitation, a motorist can tour almost at will throughout the lowlands.

During the past season many tourists report having driven the first car into towns of no mean size. Strangely enough, each states that the cars seemed to arouse little curiosity. Modern literature is too well filled with pictures of motor cars to permit of any surprises.

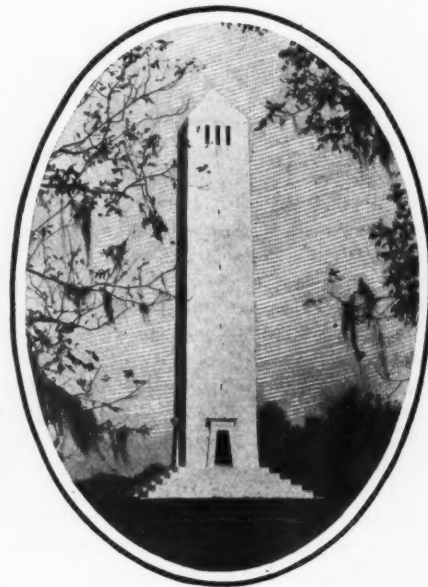
While topographical conditions vary in different sections of Louisiana, as well as in Mississippi where conditions are almost identical, the proportion of good and bad roads is about the same. Improved trunk lines exist in nearly every section, but if the tourist stays on the heavily traveled roads connecting the larger places, the real enjoyment of a tour in this section of the south is lost.

## All Roads Not Bad

Off the trunk line highways all roads are not bad. The trouble is that segments of good roads are scattered. A stretch of a few miles may leave nothing to be desired, only to be succeeded by a few miles of the worst road imaginable. The tourist soon learns to take full advantage of the pieces of good roads. The best time that is practical should be made, as there is no



SAMPLE OF SHELL ROAD SYSTEM AROUND NEW ORLEANS



Monument on Chalmette battlefield where General Jackson defeated the British in 1812

telling what delays may be encountered a little further along.

These stretches of good roads often are the result of the work of some especially enterprising community that has improved the roadway through its district. Again, the coastal plain may rise in a gentle swell that permits of drainage. Through limited sections there are strips of a clay and sand mixture that make an excellent surface, but throughout the greater portion of Louisiana and Mississippi the soil is alluvial, which with a little moisture forms a mud of extraordinary viscosity.

#### Big Tires Help

To look at many of the country roads or to watch an animal-drawn vehicle laboring along, nine drivers out of ten would say such a highway could not be negotiated with a motor car, but the density of the soil, which a narrow tire cuts deeply, is more generous to the broad tires of a motor car. During the recent state elections the candidates proved what could be done with a motor car if an honest effort were made. Regardless of the condition of roads, cars were forced into every nook and corner of the state and, what is more, better time was made than could have been hoped for had a horse-drawn buggy been chosen.

In getting off the main roads there is little difficulty in securing gasoline. Purchases can be made in any village store and generally there is no difficulty in replenishing supplies at plantations. No parts or sundries can be purchased and in case of accident to a vital part of the car parts will have to be ordered by telegraph or telephone from some one of the larger towns. As rural mail deliveries are made each day into even the more remote parts of the state repair parts can be had promptly. There is little objection from this feature, as touring parties leaving the main roads usually have plenty of leisure time, and while repairs are being made additional time is given for acquiring a

more intimate knowledge of these interesting communities. There are no garages, but cars can be housed at the village barns. A charge varying from 50 cents to \$1.25 is made, which includes a washing or cleaning of the car.

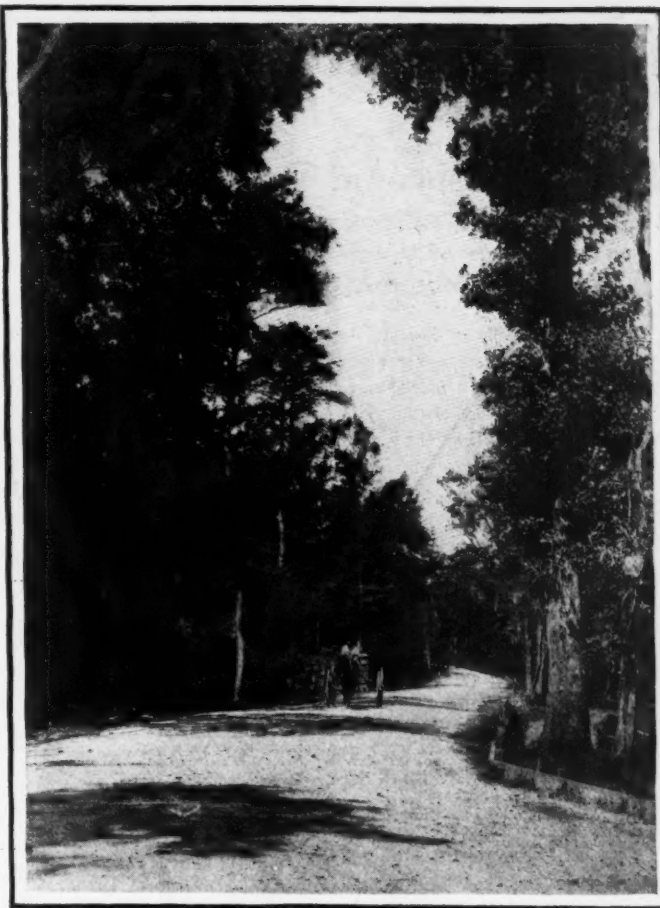
It would be difficult to find any other section of the United States where travelers are offered such bountiful meals. Rural Louisiana and Mississippi are famous for the excellence of their cuisine. Twenty-five cents will buy a meal hard to duplicate at any price in any city. In the larger villages regularly conducted hotels are found, but in the smaller places transients are cared for at boarding houses.

By far the greater part of the touring done in Louisiana is confined to two routes. One runs north to Memphis via Baton Rouge, and the other lies westward along the line of the Southern Pacific. At all of the larger towns along these routes regularly equipped garages will be found, as well as fairly complete lines of parts and sundries. If the weather is at all favorable there is no trouble in making 130 miles a day as an average. On the westward route there are now but few stretches of unimproved roads. Long and heavy rains are required before this route would be closed to the motorist for even a day. Due to the amount of improvement being made this winter on this route there are some places where the going is heavy, due to new gravel.

#### Levee Road Proposed

There is one serious drawback to the main road between New Orleans and Baton Rouge. It follows the base of the levee and seepage from the river never allows the surface to dry thoroughly. Despite this fact this is the most popular route for New Orleans tourists. There is hope of securing permission to build a road along the crown of the levee. When this is a reality Louisiana will have one of the famous scenic routes of the world.

Eastward from New Orleans there is a magnificent shell road to Chef Menteur, 30 miles from the city. Beyond the roads are very bad. There is a bad ferry at the



TRUNK-LINE ROADS THROUGH COUNTRY GENERALLY ARE WELL KEPT UP

Rigolets, but a few miles beyond the Mississippi border there is a good road connecting the summer resort towns along Mississippi sound. By improving a few short stretches a good highway can be secured into Mobile.

#### Beauties of Lake Pontchartrain

Across Lake Pontchartrain, which bounds New Orleans on the west and north, there is a considerable mileage of improved roads. Cars from the city are carried across the lake on any of the regular boats with little delay or expense, and the good roads throughout this prosperous agricultural region are attracting tourists.

Hotels in interior towns and villages in Louisiana charge from \$1 to \$2 per day, American plan. The table is uniformly excellent and the conveniences are on a par with the average rural hotel.

Short drives from New Orleans form the most popular pastime of motor car owners. The shell road system which surrounds the city could hardly be improved. They connect the city with the resorts on Lake Pontchartrain and with the club house of the Louisiana Motor League at Chef Menteur, 30 miles out. Unquestionably the most popular short drive out of the city is to the monument on the battlefield at Chalmette, where General Jackson directed one of the most spectacular victories ever won under the stars and stripes.



Old defense tower, a type of fortification which dots southern Louisiana





# The Readers' Clearing House



## Favors Mushroom Type Chicago Reader Takes Exception to Discussion of Valve-Lifter Types by Motor Age

CHICAGO—Editor Motor Age—Taking exception to the answer regarding the relative action of roller and mushroom valve-lifters in the January 9 issue of Motor Age, I think that some of the statements made are misleading in the ignoring of the offset construction of the usual cam in relation to the larger mushroom valve-lifters which transforms them virtually into roller rather than friction types through the rotating of the follower about its vertical axis as the cam thrusts.

The Readers' Clearing House states that more clearance must be allowed between valve stem and tappet in the mush-

room type even may be a trifle less than with the roller type and get the same results. The cam can be designed for noiseless action with as little loss of efficiency as other types and the manufacturing is much cheaper. By setting the cam to one side of the valve stem center a rolling contact is obtained without extra mechanism and with only a negligible amount of side thrust on the tappet. The cam shape differences between the two types are determined wholly by the form of follower and for no other reason. I would like to hear further from Motor Age on this.—Jack Kneiff.

There are two types of mushroom valve-lifters, one the revolving type, and the other the direct-lift type. The majority of mushroom valve-lifters are of the centered type. What Mr. Kneiff has to say regarding those of the revolving or offset

**EDITOR'S NOTE**—To the readers of the Clearing House columns: Motor Age insists on having bona fide signatures to all communications published in this department, not necessarily for publication but as an evidence of good faith. Motor Age will not publish communications where this rule is not lived up to.

by it as pay for the decrease in cam wear. Rather than use this type, a large number of manufacturers use the centered mushroom type, or the direct-lift type. These, it has been found are much cheaper than the roller type, and the friction is confined to the cam-bearing end of the lifter. This is hardened to almost the degree of hardness of the cam, and such wear as takes place may be readily taken up by the tappet adjustment. The roller type is generally considered at least the equal in efficiency of other types, and is preferred by makers who can afford the extra-cost because of its silence.

The bearing of the roller is a line, and never varies in position, while wear in time will dish the friction type out, and throw the acceleration out of time. Fig. 4 shows this comparison, while Fig. 6 shows three examples of American practice in lifter design.

In respect to Mr. Kneiff's statement that the convex cam belongs to the roller type, and the straight type belongs to the flat-faced mushroom revolving disk or direct type, Fig. 2 shows the action of an exhaust valve. If the straight face is used for the flat-faced type, the point of bearing will start at A and travel to B, when the rate of drop of the cam will exceed the speed of the spring-return at high to medium speeds, and the lifter will drop, hammering the cam on its flat face. This is the secret of the superior silence of the roller type.

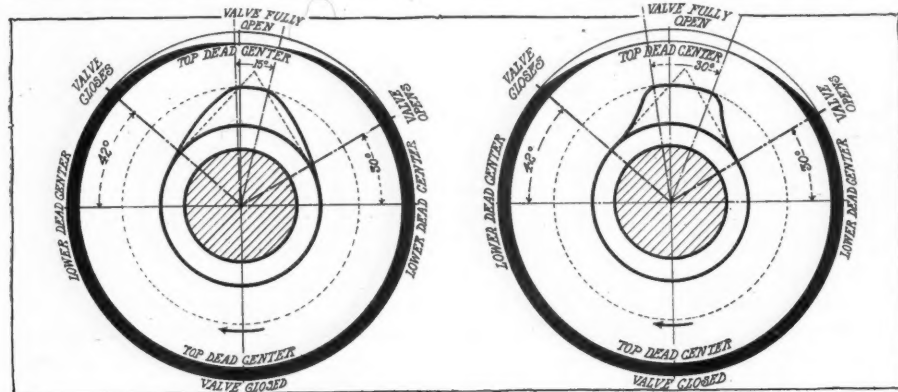


FIG. 1—SHOWING WHY CONCAVE-CUT CAMS ARE BEST

room type on account of the lost motion in the latter, than on the roller construction. It is stated also that there is virtually constant contact in the roller type and a hammering in the mushroom type. The shape of cams shown certainly did not illustrate this point. If they had been interchanged the point might have been made.

However, the whole discussion centers on cam design and it is just as possible to make a cam with the mushroom follower that will follow during the whole revolution as with the roller type. It is just a question of what one wants to sacrifice in either case, noise or efficiency. The writer for a number of reasons not wholly theoretical favors the mushroom type for ordinary purposes. Though the roller wears longer theoretically, a properly-designed mushroom follower will last fully as long in practice. There need be no more clearance than with the roller type and no more lost motion. The opening and closing of the valve can be made quicker than with the roller type without undue noise and side thrust, and thus more power gained in the cylinder. The

type is largely to be endorsed, but as is shown in Fig. 4 the revolving mushroom, or as it should be called, the disk type of lifter is not entirely without fault.

The drawing shows the constant side stress that is exerted by the offset cam, and the increased friction that is exacted

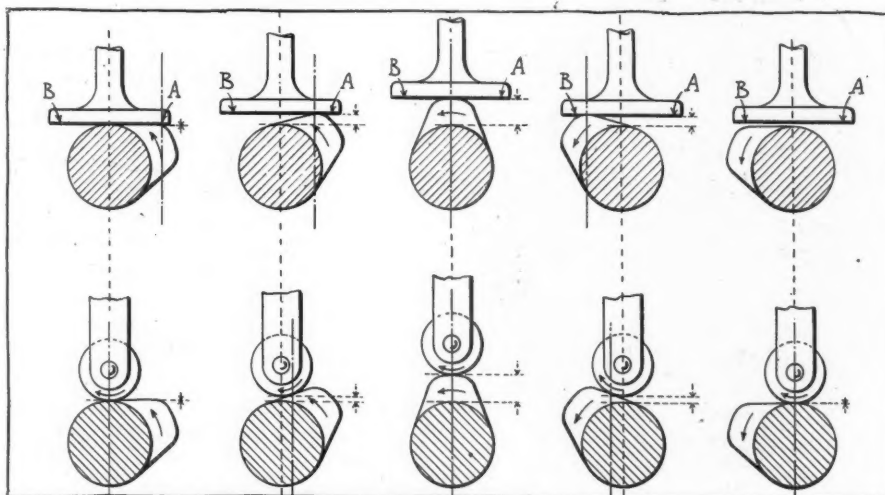


FIG. 2—WHY FLAT LIFTERS WEAR AND ARE NOISY AND WHY ROLLER LIFTERS LEAD LONG AND SILENT LIVES

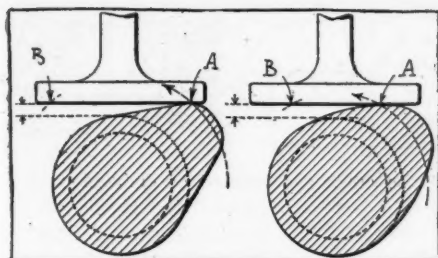


FIG. 3—NECESSITY FOR CONVEX CAMS WITH FLAT LIFTERS

To quiet the flat type, it has to be cut convex, to prevent this sudden drop, and to make the point of contact at the time of hammering a line, and not a plane. This convexity also narrows the travel of the point of contact, as shown in Fig. 3. But, as shown in the chart, Fig. 1, this is not the ideal form, in fact, experience shows that the ideal cam is concave, to give a rapid lift, and a sudden drop, keeping the cam open the longest possible time. This cam shape is practicable only with the roller cam.

From the foregoing, it is to be concluded that from a theoretical standpoint, roller cams permit the cam to be so formed that the valves open more quickly and stay fully open for a longer period, with the same valve timing; as the cam may be designed for the utmost efficiency, not requiring a special form to allow for the faults of the lifter. What is true in theory is usually to some extent in practice.

#### MOTOR WINCH EXPLAINED

Du Bois, Pa.—Editor Motor Age—In the issue of December 5, 1912, in H. C. Lester's article on the Borderland Trail, reference is made to a light rope, pin, and hammer necessary in applying the windlass hitch to the car when stalled in mud or sand. Would Motor Age kindly describe this windlass hitch or appliance?—A Reader.

This appliance is illustrated in use in Fig. 5. It consists of a rope or cable, sufficiently stout to serve as a tow-line, a stake, preferably of tough hard wood,

**EDITOR'S NOTE**—In this department Motor Age answers free of charge questions regarding motor problems and invites the discussion of pertinent subjects. Correspondence is solicited from subscribers and others. All communications must be properly signed, and should the writer not wish his name to appear he may adopt a nom de plume.

and a heavy hammer or hatchet, the ax referred to may be used, to drive the stake into the ground. On cars in which the rear wheel hub extends out beyond the wheel, this is all that is necessary. Tie the rope to one spoke of the wheel, close to the hub, and the other end to the stake, several feet in front of the car. Go into low gear, and let in the clutch gradually. The rope will be wound up on the hub, converting the latter into a windlass. This will extricate a car from the mud more quickly, easily, and cheaply than any other means.

When the rope has covered the hub, it will slip off, when the brake should be applied, and a fresh hitch secured on the spoke. The wheel in the figure has had

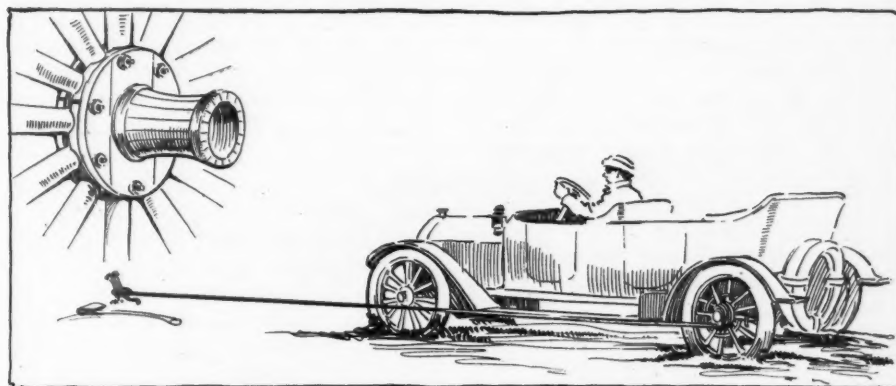


FIG. 5—PULLING CAR FROM MUD BY OWN POWER

its third hitch. Some cars have the hub-plate or cap almost flush with the wheel, so that a reel of some sort must be applied.

Such an attachment is shown in the figure, and can be made by any good

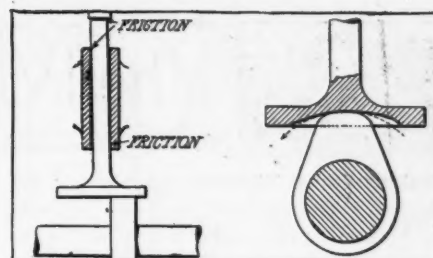


FIG. 4—FAULTS OF FLAT LIFTERS

woodworker. The back-plate is split, so it may be placed about the axle. In touring, the not-too-fastidious tourist will leave such a windlass on his car. The ambitious workman will devise some means of securing the windlass to the brake-drum direct, but as far as practical value is concerned the attachment shown herewith will serve its purpose.

#### TIMING AIR-COOLER

Hendricks, Minn.—Editor Motor Age—Will you tell me how to set air-cooled engine valves?—E. W. Senn.

In an air-cooled engine, as in any other,

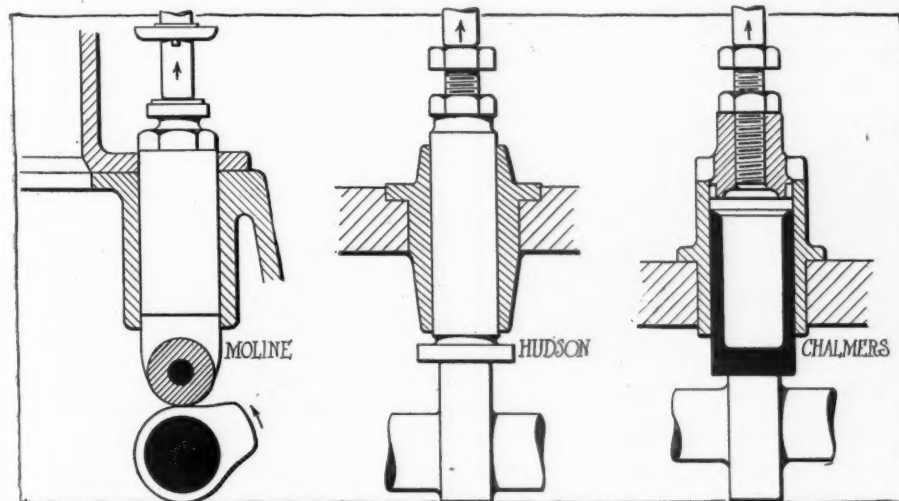


FIG. 6—MOLINE ROLLER LIFTER, HUDSON MUSHROOM TYPE, AND HOLLOW STRAIGHT TYPE ON CHALMERS

no attempt should be made to re-time the valves without gear-marks or an authentic formula. If you have an engine that is taken down, and you do not know how to set the timing gears, first look for marks on the timing gears. It will probably require some searching to find them. If these are not to be found, write the maker of the motor for a valve-timing formula.

#### DIFFERENTIAL WHEEL SPEEDS

Martin, Tenn.—Editor Motor Age—In turning a curve which wheel of a car turns faster than the other?

2—Do not the front wheels run at the same speed, while the outside rear wheel runs slightly slower than the front wheels, and the inside rear wheel still slower than the other three?—B. F. Lavendar.

1—The outside wheels normally revolve faster than the inner ones.

2—The outer front wheel and the outer rear wheel should turn at the same speeds, in describing a circle, if the car tracks properly. Both inner wheels should turn at equal speeds. In actual practice, in rounding curves, the rear wheels usually do revolve faster than the front ones, but this is due to loss of traction.



# The Motor Car Repair Shop

## Making Socket Wrenches

**M**AKING socket or pipe wrenches may seem a very difficult matter to the novice, but in reality their making is comparatively easy. The only necessary material for the construction of a socket wrench is a piece of pipe. The diameter of the pipe depends upon the size of nut for which the wrench is intended.

The first thing to do in making the wrench is to fit the nut into the end of the pipe, as shown in Fig. 1. As will be noticed, if a square nut is used, the diameter of the pipe must be equal to the diagonal of the nut. The depth of the wrench mouth may be made any distance by inserting more of the same nuts. For example, if the repairman wishes to make a wrench with its mouth 3 inches long and the nut is only  $\frac{1}{2}$  inch high, it will require the insertion into the mouth of the pipe of six nuts.

After the nuts have been inserted the parts of the pipe facing the sides of the nut are flattened in a vise. All four sides are flattened and then the nut or nuts in the now squared-end pipe are removed. Tapping the pipe against the work bench usually causes the nut to drop out.

A hole of convenient size, usually  $\frac{1}{4}$  inch, is then drilled through the pipe about 1 inch from the top, Fig. 2, and through it a rod is passed. The rod is used for turning the wrench.

The almost completed wrench is shown in Fig. 2. The only thing that remains is to case harden the mouth of the tool.

## Scraping Battery Plates

Scraping the plates of storage batteries is a practice that often is used with the idea that the battery will not need recharging, but if the action that takes place within the cell is known, it will be evident that plate scraping is detrimental to battery life.

When a battery needs recharging, it is due to the fact that lead sulphate has formed in the lead plate and on the surfaces of the plate. This substance is not acted upon by the acid in the battery and since the sulphate deposits itself in the form of a film over the plate surfaces, the plate is immune to the action of the acid, hence the battery needs recharging.

When the recharge current is sent into the battery it decomposes the sulphuric acid into sulphur dioxide and hydrogen gases and these act on the plates and remove the sulphate of lead. As soon as this is off the plates the action in the battery will continue of its own accord until the plates are again saturated with sulphate of lead.

If the plates are scraped the gelatinous mass on the surface is removed but that contained in the pores of the lead, remains. We see then that scraping the

plates really does not help it materially for there is still some sulphate of lead in the battery. However, if out on a country road and the motor is running on battery current and this suddenly begins to fall off, there is no reason for not scraping the plates. It will be far cheaper to scrape the plates, perhaps with good results, than to send to the city for a tow. But under ordinary conditions the battery plates should be permitted to free themselves of the sulphate chemically.

## Recharging Magneto Magnets

It is a very simple matter to recharge a set of magneto magnets providing one has the facilities and knows how to use them. For instance, in Fig. 3 is shown the electro magnet employed in the repair-shop of a large taxicab company, for the purpose of recharging magnets. It comprises two heavy coils of insulated 20-gauge wire, wound so as to give 10,000 ampere turns to the square inch. The windings are around soft iron cores  $1\frac{1}{8}$  inches in diameter. The bottom ends of

these cores are secured or embedded in a heavy soft cast iron base plate; whilst rectangular cast steel pole pieces, counter-sunk to fit over the top ends of the cores, are provided. These pole pieces are braced and held parallel by means of two non-magnetic brass strips. This electro-magnet is mounted substantially on a wooden stand as indicated, which brings the pole-pieces of the magneto to about the height of the hips of an ordinary sized workman, thus rendering the operation of recharging convenient. The two cores are wound in opposite directions to form a north and south pole, and the proper magnetizing strength is obtained when a current of 40 volts at 3 amperes is passed through the windings.

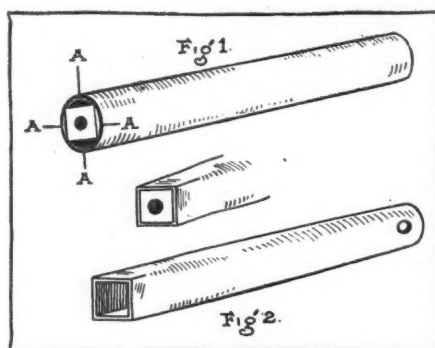
The operation of recharging a magnet already has been very thoroughly described and illustrated in the Readers' Clearing House columns of the Motor Age, and full details may be obtained by any reader through this department. In short it simply consists in wiping and rocking the poles of the magnet over the pole pieces of the electro-magnet, having due regard for the relative polarity of the magnets.

## Weak Magnets Cause Misfiring

When a magneto has been in constant use for a considerable length of time, misfiring and a consequent loss of power may be exhibited by the motor, due to lack of sufficient heat in the spark caused by a weakening of the magnets. The misfiring, in such a case, is particularly noticeable at slow speeds when the magneto is not operating at a high enough speed to generate a strong current.

The best remedy for trouble from this source is obtained by having the magnets of the magneto recharged; but temporary relief often may be obtained by adjusting the points of the spark plugs so that all are brought a little closer together; and all equally distant apart; that is, the gap between the points should be the same on all plugs. If the gaps are not all the same, then the plug with the widest gap generally will be the first to misfire, as a result of weak magnets.

When running a car slowly on the high-speed gear, the engine may be turning over so slowly that the magneto will not generate the required current, and misfiring accompanied by a jerky action of the car will take place. When this occurs, one should either shift to a lower gear, or switch over onto the battery. The better plan is to shift to the lower gear, if in congested traffic when the car speed cannot be increased; for by so doing one speeds up the engine and magneto; more current is generated, a hotter spark is produced, and misfiring is eliminated.



THREE STEPS IN MAKING SOCKET WRENCHES

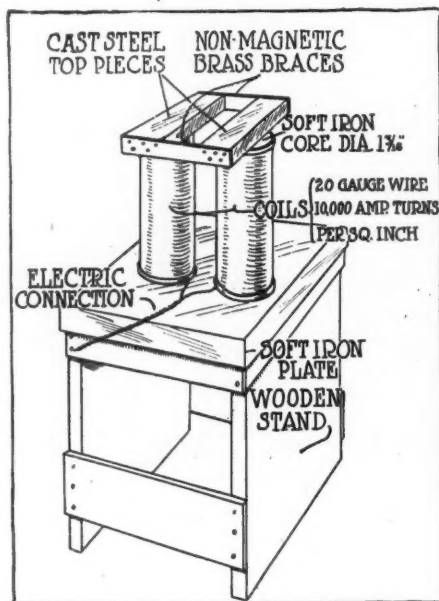


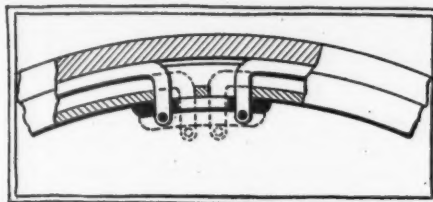
FIG. 3—APPARATUS FOR RECHARGING MAGNETS

# Current Motor Car Patents

**FIAT Differential Shaft Drive**—Nos. 1,050,049 and 1,050,050—To Giovanni Angelli, Turin, Italy, assignor, by mesne assignments to the Fiat company, Poughkeepsie, N. Y. Filed January 16, 1907, and the latter divided and application filed December 15, 1909. Dated January 7, 1913. These two patents refer to an axle mechanism in which the drive axles are on an angle with one another, forming an arched or cambered axle, a differential drive through double concentric propeller shafts and a pressed steel housing for the same. The first patent relates to a driving shaft, connected through a universal joint to a differential gear, the weight of which is carried by the frame, in the main, instead of by the axle. This differential is of the bevel-gear type, and drives respectively a shaft and a sleeve inclosing the shaft. These drive the divided drive-axle through bevel gears, carried in the rear axle housing. The second patent covers a three-part pressed steel axle and shaft housing.

**Automatic Signal**—No. 1,049,749—To Charles F. Marston, Great Neck, N. Y. Filed June 11, 1910, dated January 7, 1913. To warn following vehicles of the intent of the driver of a motor car to stop, this signal comprises a casing, secured to the rear of the car, in which a signal, mounted on a journaled shaft, is disposed. This shaft is operated by a gear in mesh with another gear, connected to a drum. On this drum is a spring, adapted to hold it in a position wherein the signal is revolved in the casing to a position where it is not visible. A cable or cord connected with the brake-operating mechanism revolves the drum when the brake is applied, thereby turning the signal-carrying shaft to a position where the signal is visible as a warning.

**Packard Compression Release**—No. 1,049,487—To Russell Huff, Detroit, Mich., assignor by mesne assignment to Packard Motor Car Co., Detroit, Mich. Filed July 20, 1906, dated January 7, 1913. As an aid to starting, this device consists of a slidable exhaust-valve camshaft, whereby



BOOTH RIM

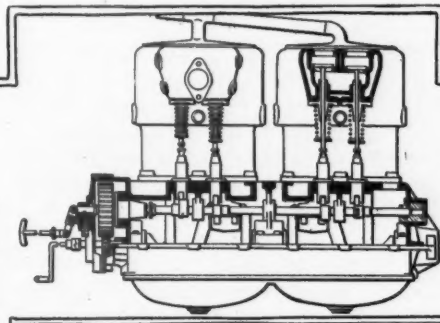
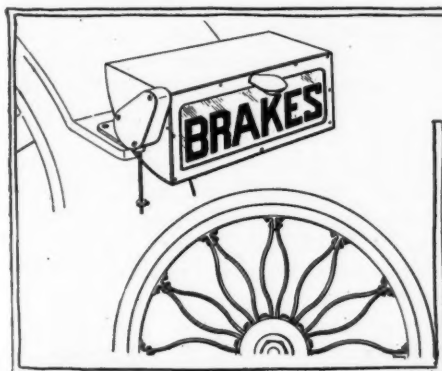
the compression of the engine may be relieved, to facilitate the hand-rotation of the crankshaft. It consists of a camshaft with two sets of cams, the first for the normal operation of the valves and the second to raise the valves slightly from their seats. The sliding of the camshaft is accomplished by means of a spindle connected with the camshaft, in such a way as to permit its rotation, and operable by a suitable handle. In operation, this handle is drawn out, which moves the shaft inward, bringing the auxiliary cams into play, raising the valves and permitting the easy cranking of the motor.

**Stewart Oil Carbureter**—No. 1,049,417—To Alfred C. Stewart, Los Angeles, Cal. Filed February 27, 1911, dated January 7, 1913. For the use of the less volatile oils, such as kerosene, as a fuel for internal combustion engines, this patent relates to a carbureter of the float-feed type, comprising a gasoline chamber with an oil inlet controlled by a float and valve, an air chamber and a fuel well open to the atmosphere. The latter is slightly below the fuel level, and has a valve communication with the float chamber. In the air chamber, which also has an opening to the atmosphere, is a piston valve, normally seated by its own weight. From the fuel well a tube extends to the exhaust manifold, or other warming means, and discharges in the inlet manifold. The air chamber communicates with the inlet manifold through a butterfly throttle. A

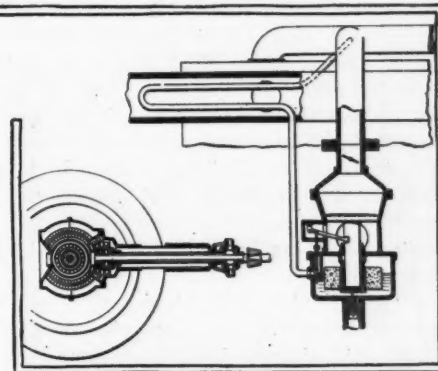
linkage connects the air-valve and the gasoline valve, so that upon the suction of the engine unseating the air-valve, the fuel valve is also opened. At low speeds, the bulk of air drawn in by the engine is taken through the warm tube from the fuel wall, where it is mixed with fuel vapor. As the speed of the engine increases, the suction raises the air valve, and with it the fuel valve, permitting a greater proportion of air and a greater quantity of both air and fuel. With the throttle closed, no suction is present to raise the air valve, so that both valves are closed.

**Booth Q. D. Split-ring**—No. 1,049,442—To William N. Booth, Cleveland, O. Filed December 5, 1910, dated January 7, 1913. In a Q. D. rim, provided with a split locking ring, which is normally contracted within an annular groove in the rim, this device consists of a retaining slip-ring to be placed over the extending lugs at the extremities of the ring to hold it in either expanded or contracted position. This consists of a link with two sets of slots, the outer set being so spaced as to hold the ring expanded so as to permit its removal from the rim, and the inner so as to secure it in the contracted position, retaining it on the rim.

**Spring Wheel**—No. 1,059,418—To Harper E. Stratton, Empire, O. Filed December 12, 1911, dated January 7, 1913. Spring spokes constitute the resilient element of this wheel, the spokes being composed of bowed steel straps of spring steel, bolted in opposing pairs to lugs on the felloe of the wheel, and flexibly held in slots in the hub. The hub is provided with recesses in its periphery, these recesses being separated by radially directed ribs. Between the recesses, in which the spokes are free to slide, are wedge-blocks adapted to keep the spokes spaced. In action, the spokes are bowed under impact, those bowed being pushed into the slots or recesses, and those opposite drawn outwards slightly. This wheel would also take torsional shocks, such as driving and braking.



LEFT—MARSTON SIGNAL AND STRATTON WHEEL. CENTER—PACKARD VALVE-LIFTER. RIGHT—STEWART CARBURETER AND FIAT DRIVE





# Inspection by Electric Truck Makers

FINAL INSPECTION RECORD			Mfg. No.
Model	Sold to	Used in	
Battery	Tires	Mounting	
Meter	Cut Out	Equipment	
Odometer	Speeds		
Lamps			
Signal			
Est. Comp.		Remarks	
Hoods			
Bumpers			
Seat			
Body Type			
Maker	Cost		
Print	Photo		
Size			
Plate	Call No.		
Painting			
		Ins. By	

POWER DRAFT ON BRICK PAVEMENT	
LOADING	LIGHT
AMPERE	VOLTS
MOTOR	
CONTROLLER	
LUBRICATION	
GREASE CUPS	
SIDE ROLLER CHAINS	
MECHANICAL ADJUSTMENT	
SIDE ROLLER CHAINS	
BRAKES	
FASTENERS, CLIPS, SHACKLES, STEERING ASSEMBLY, COUNTERSHAFT, DISTANCE RODS	
WHEELS	
BEARING ADJUSTMENT	
DISH OR ALIGNMENT	
TIRES	
BATTERY	
CHARGED	
GENERAL CONDITION	
LIGHTS	
BELL	
GENERAL CONDITION OF VEHICLE	

FIG. 1—INSPECTION CARD FILLED OUT AT FACTORY

It is a wise manufacturer who knows his own trucks. There was a time when a motor truck was considered off the hands of the manufacturer once it was sold and delivered. Nowadays the up-to-date firm keeps track of its vehicles after they are sold, watching the users to see that the machines are not abused, checking up drivers to see that they are handling the trucks with discretion, and assisting in every way to make the vehicles a success after they are sold.

There is a reason for this. It has been found that nearly every firm which purchases a truck and makes a success of its use buys another, and often with the larger firms buys a whole fleet, generally of the make of the first. If the first truck is not successful it is probable that the firm will be doubly hard to convince when it comes to making a further sale, if it listens at all.

If the first truck makes good, and it is necessary for it to do well to make the second sale, it is equally important that the two trucks make good as a recommendation toward the use of further machines.

## Not Always Car's Fault

In these days of well-built trucks when one fails to show a gain over horsed systems it rarely is the fault of the machine but of the way it is used. On this account firms are not only making regular inspections of the vehicles they have sold to see that they are mechanically right, but a number have hired special transportation experts to inspect and report as well on how the trucks are used in a business way. If these men see that a change in shipping room facilities will help to make the truck more successful they suggest the change, or if there is a quicker loading or unloading scheme that could be used they offer that.

A truck is above all a business servant and on its success as a servant depends its reception in any industry. If an improper loading platform keeps the truck

FIG. 2—INSPECTOR'S REPORT TO FACTORY

from serving a store the truck is just as much a failure in that business as it is as though the motor would not run without overheating, for the loading platform so far as the store is concerned is a part of the truck at the hours when the vehicle is adjacent to it. This being the case, if the manufacturer wants his machine to make good and obtain records he must check up loading platforms and shipping clerks as much as vehicle platforms and drivers.

The latter line is new, and as yet no figures or report blanks for this work are available, but for the mechanical inspection of the vehicles there are excellent forms in use.

With electric trucks a periodical inspection is most necessary and many factories keep a record giving the condition of every car sold at stated intervals of its existence.

This is even more important with electric trucks than with gasoline trucks, for the life of a storage battery depends directly on the care given it, and these monthly inspections can give to the manufacturer reasons for failures here and there before they become serious enough to spoil a battery, and to suggest changes which will head off disaster. In some cases it has been stated manufacturers have taken machines from customers and returned their money rather than have them abuse the trucks for faults brought on through their own neglect or carelessness. Whether this be true or not it is a fact that the man who injures a car which he has pur-

chased and which belongs to him legally is at the same time injuring the manufacturer of the machine to almost if not quite the extent which would obtain if the car were still the property of the maker and only loaned to the user. The damage to the one car comes out of the pocket of the buyer, it is true, but the damaged reputation of the machine may be a greater loss to the manufacturer than the cost of many vehicles. Thus it has been found important that factory and dealer keep track of all cars sold.

There are three main branches of the records covering the inspections. First, the factory wants to know of the dealer how things are going, and if the dealer is doing his inspection duty as well as whether the car is giving satisfactory service. Then the inspector, who may be sent out by the local dealer under factory supervision, must report to the dealer.

As a double check on the batteries the makers of these units have their own inspection of cells at stated periods so that so far as batteries are concerned both the makers of the car and the makers of the batteries look for trouble every so often.

Garages handling electric trucks also have their regular inspections of cars and these very often combine their own reports with those of the dealer in reporting to the factory; that is, the dealer may have his inspection work done by a local garage and for the factory office.

## Baker Company's System

The Baker Motor Vehicle Co., Cleveland, O., in the following up of vehicles sold considers the eastern half of the United States as divided up into six territories. Each of these territories, so far as service is concerned, and to a large extent in the development of sales, is handled from a branch office, or similar central station. These branches or stations are located in Boston, New York, Cleveland, Chicago, Kansas City and Atlanta. The territory thus covered extends as far west as parallel 100.

The Pacific coast is handled in a similar manner with a central station located in San Francisco and is under the direction of a general sales and service representative. Each of these territories has numerous sub-branches or agencies. For instance, on the Pacific coast, Los Angeles and Sacramento in California, Portland in Oregon, Spokane and Seattle in Washington. In the eastern territories are similar sub-stations.

From each of these branches or central stations the company maintains inspectors in accordance with the demand which may exist through the number of trucks in operation in the territory controlled from that station.

When installing a new truck service the inspector from the proper branch assists the customer to all reasonable extent

in arranging for proper garaging facilities. This is important, for an experienced man can quickly tell if a garage is competent to handle the work. This inspector also helps in the instruction of drivers and in general instruction in the care and use of the car.

For the first 3 months that the new machine is in service the inspector visits and inspects every 30 days. If at the end of this time the machines are properly handled and seem to be giving good service and are doing their work satisfactorily in every respect the inspection period is extended to once every 60 days. This continues for the balance of the first year. After this an inspection is made three or four times a year, as an inspector may happen to be in that locality.

This is a general schedule that it is attempted to maintain. If machines are not receiving proper attention more frequent calls must be made.

#### Good System Used

In keeping records when a truck is shipped a final inspection card is filled out as shown in Fig. 1. This card is made in duplicate, one part being sent to the branch in the territory to which the car is being shipped. On the reverse of the card is a space for performance record. Here is jotted down any service records and any troubles that the machine may ever encounter.

Fig. 2 shows the inspector's report to

the factory. No reports go to the user from the inspector, but the factory compiles this report on the basis of the inspection. This report is made out in duplicate, one for the branch office and the card for the factory. The factory reports to the customer, points out such suggestions for better service as may occur, and in the case of motor trucks these may apply to service as well as mechanical hints.

The Anderson Electric Car Co. of Detroit aims to keep very close to the owners of the Detroit electric cars to assist toward satisfactory service in every way possible. Reports are made out by owners or superintendents or by inspectors from the company every 30 to 40 days. The regular inspection blank is shown in Fig. 3. This sort of service is maintained in New York, Chicago, Kansas City, Minneapolis, Detroit and other cities, where the firm is directly represented. Besides this the dealers have inspection systems of their own requiring as a rule that the machine be brought to the garage every so often for thus purpose. The company says:

"The electric motor if watched never should cause trouble, so you can readily see how important it is for us to lay particular stress on care being given and proper adjustments made on our cars. If this much is done then it is entirely up to the driver as to whether or not he is towed in with the car. In other words,

if he hits a curb, or runs into holes, or does not watch his meters properly, he is the one who will suffer and not the garage man.

"We have a further check on the battery, due to the inspectors of the Edison battery all over the country. They keep in close touch with their product. In fact, this is true of all the leading battery manufacturers. Our cars are getting what might be called a dual inspection."

#### An Eastern Method

The Commercial Truck Co. of America, located at Philadelphia, is at present chiefly endeavoring to market its product in Philadelphia, New York and Boston. Regarding inspection, this is done by experts and a report on all of the cars in service is made once or twice every month. The inspector's sheet contains a number of important items to be checked, as well as the general condition of the car. On receipt of this report the head office takes steps to rectify any trouble or misapplication that may be apparent.

In the event of breakage or need of replacement of a part the firm has spares, such as wheels, batteries, etc., to rent the user at a nominal charge while the parts of the car broken are being repaired.

Minor adjustments are made by the inspector at the time of inspection, and where repairs of a more serious nature are necessary the work is done as a rule by the service department of the firm.

FIG. 3—CAR INSPECTION REPORT OF ANDERSON COMPANY

FIG. 4—TWO SIDES OF G. V. CO.'S INSPECTION REPORT

FIG. 4

If necessary a vehicle is rented to the user while the repair is being made.

Fig. 4 shows the General Vehicle Co.'s inspection report, both the front and back sides being illustrated. These forms are very complete, covering the looking over of every important part of the car, and on the back having spaces for listing points connected with the car's service.



**ONE County Without a Car**—There is only one county in Alabama without a motor car. This is Winston county. There are a number of counties in the state that have no railroads.

**Southerners Promoting a Run**—The Atlanta Automobile and Accessory Association has appointed a committee to co-operate with a similar committee of the Jacksonville Automobile Club in promoting a run from Jacksonville, Fla., to Atlanta, Ga., in April.

**Champaign Elects Officers**—At a meeting of the Champaign County Automobile Club of Champaign, Ill., the following officers were elected for the ensuing year: President, Harry Herriek; vice-president, Edward Kirkpatrick; secretary, Charles D. Stevens; treasurer, Eugene I. Burke. The membership has grown to 100.

**Road Work in Alabama**—During 1912 the Alabama state highway commission had actual charge of the construction of 118 miles of improved roads. For the most part the work was done on short sections leading out from a town into the most populous farming district. The advantage of the one road soon is expected to convince farmers on other roads of the necessity of a similar improvement. Increased taxes have repaid the state for its expenditure.

**Against Horsepower Registration**—Motorists in Ohio are preparing to oppose the passage of a law by the legislature, changing the system of registration fees from a flat rate for electric and gasoline cars, to a sliding scale based on the horsepower of vehicles. Governor Cox, who was inaugurated as chief executive January 13, is heartily in favor of the sliding scale. It is suggested that the fees be fixed from \$5 to \$30 yearly, according to the horsepower of the motor vehicles registered.

**Motor Cars Not Baggage**—The Texas state railroad commission has issued an order amending its circular relating to the transportation of baggage from passenger trains in this state so as to provide that motor cars shall not be accepted as baggage in regular baggage cars, but they may be transported in extra baggage cars at additional compensation. A charge of 10 cents per mile for motor cars or other motor propelled vehicles, with a minimum of \$5 for each motor car in addition to the regular charges for extra cars is provided.

**Kentucky's Tag Report**—The growth of the use of the motor car in Kentucky is reflected in the semiannual report of Secretary of State C. F. Crecelius, made January 1, 1913, to the state auditor, H. M. Bosworth. The clerk has collected in the calendar year ending December 31, 1912, within \$8,065.20 as much for licenses as was collected during the preceding 18 months, from June 13, 1910, when the law went into effect, until December 31, 1911. The total collected for licenses in 1912 was \$37,260.30. For the first year under the

## From the

law, from June 13, 1910, to June 14, 1911, collections amounted to \$23,340.50, and for the 18 months until December 31, 1911, they were \$45,325.50.

**Illinois Has Concrete Road**—The concrete highway between De Kalb and Sycamore, a distance of 5 miles, has just been completed and is the first of the kind of any considerable length in Illinois. The width is 12 feet.

**Would Slow Doctors**—An effort is being made by members of the Milwaukee common council to revoke the resolution adopted 8 years ago whereby physicians on duty were given special privileges by being permitted to exceed the speed limit set down by the state law for cities and villages.

**Due to Good Roads**—Twice as many bales of cotton are being hauled at one load between Anniston and Jacksonville, Ala., due to the building of the model road last year. Even the worst enemies of road improvement have been converted, as land values along the line of the new road have increased 20 per cent during the fall. Additional road work has been ordered and will begin in the spring.

**Michigan After Gasoline Law**—Every Michigan motor car owner is interested in a bill prepared for the legislature by Representative L. J. Wolcott, of Albion. The bill is aimed to regulate the sale and quantity of gasoline in Michigan. It provides for a specific gravity of at least 60 degrees Beaume for all gasoline and the labeling of all containers with the specific gravity of the gasoline they hold. All below 60 degrees must be labeled naphtha.

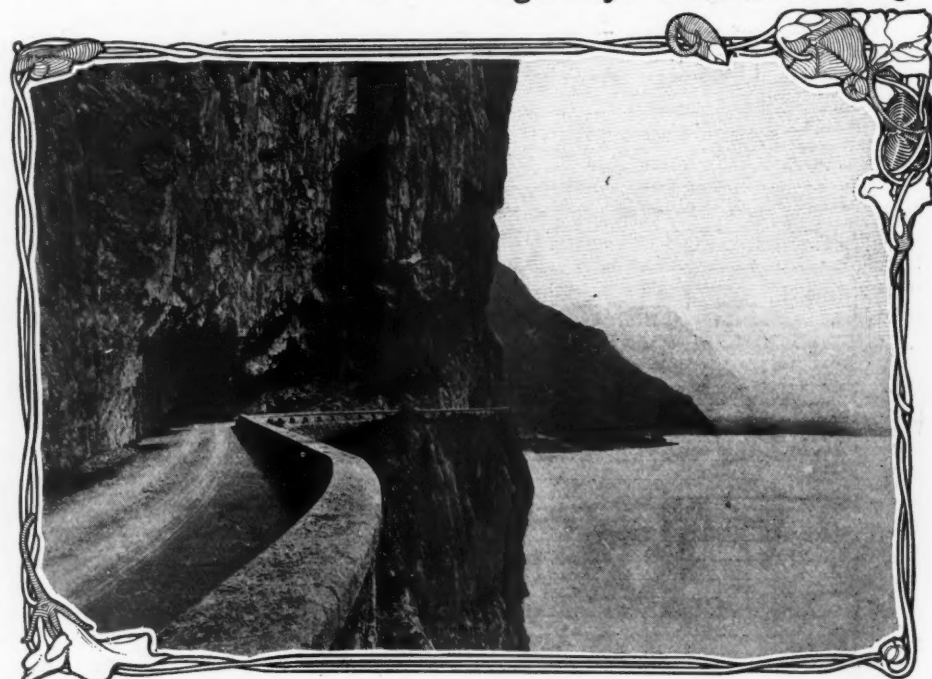
The bill also provides for state inspection of all gasoline, the law on the statute books at present providing only for the inspection of kerosene.

**Wilmington Signboarding**—For the benefit of visiting motorists who are passing through Wilmington, Del., and also for Delaware motorists who are not familiar with the city highways and their leads, the street and sewer department, which has control of the streets, has erected large, plain, legible signs on lamp posts in different sections of the city giving the directions to the next towns.

**Texas Has Motor Mail Service**—It is announced that the federal postoffice department has let the contract for the establishment of a motor car mail line between Roswell and Carrizozo, N. M. This line will be about 80 miles long. The new service will be started February 1, at which time the Roswell-Vaughn line will be discontinued. The line to Carrizozo will give about a half-dozen offices in Lincoln county a daily mail service.

**Information for Tourists**—Announcement has been made by the New Jersey and Wilmington Ferry Co., operating a line between Wilmington and Penn's Grove, N. J., that it has bought a regulation ferryboat, with a capacity for 1,000 passengers and twenty-five vehicles, which will replace an excursion boat, the Ulrica, which has been operated on this line. As it is understood to be the intention of the state of New Jersey to complete the boulevard connecting Penn's Grove with Atlantic City, the new ferry will make

**Highways Constructed as**



AXENSTRASSE, SWITZERLAND, FROM PHOTOGRAPH LOANED BY OFFICE OF PUBLIC ROADS, WASHINGTON, D. C.

# Four Winds

possible a direct short route to the seashore for motorists in all states south of Delaware, and will make it unnecessary to go to Philadelphia to ferry across the river.

**Dr. Dutton Honored**—Dr. C. E. Dutton, president of the Minnesota State Automobile Association, has been elected health commissioner for Minneapolis upon vote of the new city council.

**Minnesota Shows a Gain**—In 1912 28,700 cars were registered by owners in Minnesota. This is an increase of 17,075 over 1910 and 9,425 over 1911. This increase at an average price of \$1,000 a car means that \$9,425,000 has been spent by Minnesota people in buying new cars in the year just closed.

**New Road in Yucatan**—Arrangements have been completed for the building of a motor road between Merida and Progreso, Yucatan. This will tend to a much greater use of motor cars in the Mexican state, it is expected. At present all cars owned in Merida are confined to the limits of the city's streets as the country roads are too rocky to permit of motor travel. The new road is to be surfaced with macadam.

**Tip for Tourists**—Apparently the project for a motor highway from Savannah to Jacksonville will at last be successful. For a long time an effort was made to bridge the Altamaha river, but the project was found to be too costly. A ferry has now been established at Oglethorpe landing, 8 miles from Jessup. The roads on both sides the ferry are in good condition. Interested

**They Should Be—No. 1**

parties have agreed to see that a 400-foot bridge is built over a low place in the road on the Liberty county side, and clay that road, while only a short distance remains to be clayed to give a hard road from the river into Jessup.

**After the Small Boy**—Solitary confinement for at least 1 hour in a dark dungeon in the city jail is a rule by which the police of Montgomery, Ala., hope to break up the practice of boys hanging on behind motor cars. The increasing popularity of the use of roller skates on the asphalt pavements has aggravated the evil. Boys were supplying themselves with hooks so as to make their grip more certain.

**Georgia's Registration Count**—Conservatively estimated, the value of the motor cars in use in the state of Georgia, reckoned by the registration on file in the office of the secretary of state, is \$21,360,000. The figures show approximately that there are 600 motor cycles and some 400 electric machines, leaving approximately 17,300 gasoline cars and trucks. The registration for 1912 shows 5,833.

**To Open Yosemite to Motors**—Access by motor car to the wonderful Yosemite valley is provided for in the budget of the department of the interior. The budget suggested by Secretary Fisher increases the appropriation of \$80,000 for the Yosemite national park to \$223,703. The important item stipulated is that relating to the Oak Flat road from Gentrys to the floor of the valley. This road, which is about 12 miles long, will be thoroughly improved. According to the budget no provision has been made for improving the

road from Wahwona. The recommendation provides the money shall be expended during the fiscal year, ending June 30, 1914, which will mean the valley may be reached during the San Francisco exposition year in 1915.

**New Club in Washington**—A new motor organization to be known as the Washington Motorists' Association is being formed to take the place of the Automobile Club of Washington, which was disbanded several weeks ago.

**Helping in Ohio**—State Highway Commissioner Marker of Ohio has two plans for road improvement, one of them completing roads to various markets that will amount to about 9,000 miles and establishing fine highway traveling for about 90 per cent of the market dealers of the state, the other is for roads built by the government with state aid. The plans are not yet fully developed, but nine such cross roads have already been marked out.

**Elgin Organizes Club**—The secretary of state of Illinois has issued articles of incorporation for the Elgin Motor Club. The incorporators are John A. Logan, Theodore J. Schmitz and Frederick W. Jencks. The club will campaign Kane county systematically in the interests of the good roads movement. Cars will carry speakers from town to town and an effort made to educate the people in the proposed bond issue of \$1,000,000 in that county for the construction of good roads.

**Michigan Discusses Taxes**—Attorney General Roger I. Wykes, at Lansing, Mich., has approved the bill which the Michigan State Good Roads Association will present to the legislature for the purpose of licensing motor cars and turning the money over to the state highway department. Attorney General Wykes gave his opinion upon request of Philip T. Colgrove, of Hastings, president of the good roads association. He recommends, however, that motor cars be relieved of local taxes and that the proposed license fee be raised.

**Pending Missouri Legislation**—As soon as the Missouri legislature meets in January, at Jefferson City, two or three bills will be introduced to change the Missouri motor law. The officers of the Automobile Club of St. Louis are behind one of the measures which aims to more justly equalize the licenses, speed and other conditions. The St. Louis Automobile Manufacturers' and Dealers' Association will introduce a bill to give a mechanic's lien on a car or any other vehicle for repair work done thereon. The legislative committee of the Automobile Club of St. Louis will look after some very important legislation. One of the most important measures will be the proposed law making it a felony to take or tamper with a motor vehicle without the consent of the owner. The proposed law also provides that if the offender is a chauffeur the license be revoked and not be renewed for a period of 2 years.



LAUTERBRUNNER, SWITZERLAND, FROM PHOTOGRAPH LOANED BY OFFICE OF PUBLIC ROADS, WASHINGTON, D. C.



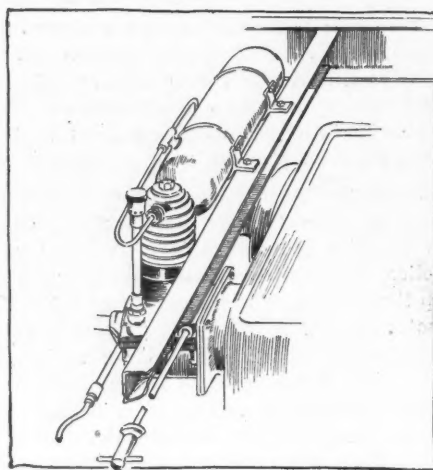
# Locomobile in Three Chassis for 1913

FUNDAMENTAL design remains unchanged in the 1913 production of locomobiles. The two cars produced last year, the four and large six, are retained with minor mutations of details of design. Interest attaches chiefly in the small six, which is a 1913 debutante. The continued models are model M, six cylinders,  $4\frac{1}{2}$  by  $5\frac{1}{2}$ , rated at 48-horsepower, and model L, of four cylinders, with cylinders  $4\frac{1}{2}$  square, and rated at 30-horsepower. The new six is known as model R, and with cylinders  $4\frac{1}{4}$  by 5, is rated at 38-horsepower.

The principal changes to be noted are in the motor dimensions on the larger six-cylinder car. The stroke has been increased to  $5\frac{1}{2}$  inches and this has, of course, necessitated changes in the connecting rod and cylinder lengths. An increase in the horsepower of the motor has been the effect of this change, the motor showing 82-horsepower at 1,800 revolutions per minute. Electric starting has been adopted in preference to the former acetylene system.

## Improvement of Details

Other changes which may be remarked are the increased valve sizes, changes in the form of the inlet and exhaust passages and a new design of locomobile carbureter. The latter differs from the former locomobile product by its longer throat and the use of both hot-air and hot-water jackets. A six-magnet magneto takes the place of the former type, while refinements in the oiling system of the 1913 cars consist of a shift of the oiling pump drive from the exhaust to the inlet side of the motor. The oil level petcock has been placed on the



TIRE PUMP ON LOCOMOBILE

left side of the oil reservoir in the motor base. A new type of main bearing oil lead has been fitted to give an increased flow of the lubricant and also to give a more direct flow.

Changes in the cooling system consist in the enlargement of the radiator and pump as well as the water jackets. The installation of the generator for the electric lighting system has necessitated a change in the water inlet manifold. Increases in the size of parts in the transmission units have been necessitated by the larger power which they are compelled to carry. Tires are now carried at the rear on brackets, which are a unit with the frame of the car, and the running boards have been left clear to give a clean appearance. A motor tire pump forms part of the 1913 equipment.

As the practice is the same in the de-

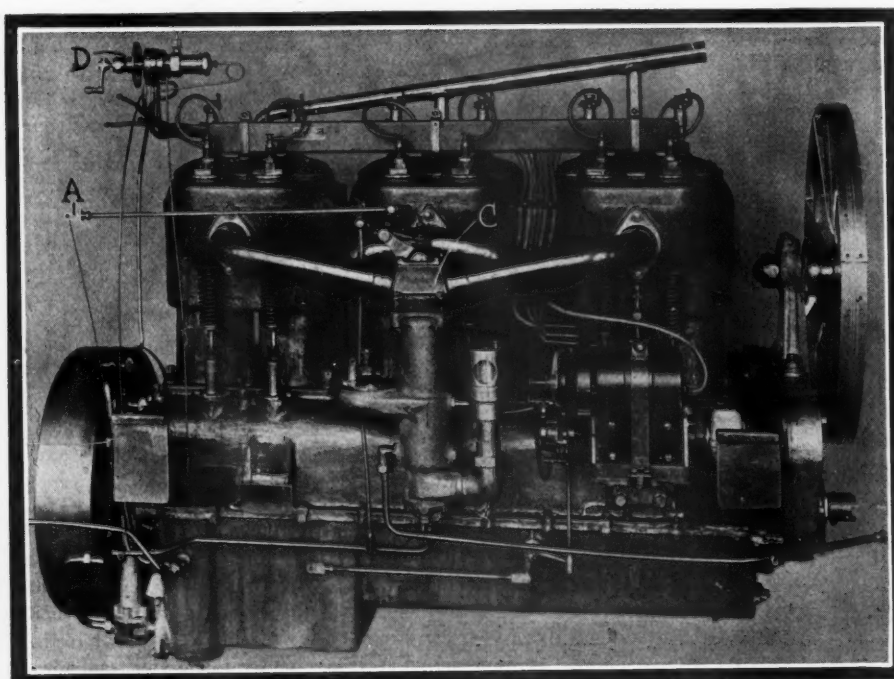
sign and construction of both sixes, a description of the smaller will cover the general design. The exterior appearance of the motor is shown herewith. It will be noted that the cylinders are cast in pairs and are mounted with a space between giving a hint of large bearing space. It will be seen that the cylinders are T-shaped castings. The  $5\frac{1}{2}$ -inch long pistons are composed of grey iron and are fitted with five rings, four of which are located above the wrist pin. A ring, which serves as an oil distributor, is at the bottom. The wrist pins are located at the centers of the pistons and are held in place by two studs, which are locked by a wire passing across their inner extremities. The material in the piston pin is chrome nickel steel case-hardened and fitted with a bronze bushing to form the upper connecting rod bearing. The diameter of the wrist pin is  $\frac{7}{8}$ -inch on the large six, which may be taken as a standard to show the proportions which exist throughout Locomobile design.

## Bearings are Generous

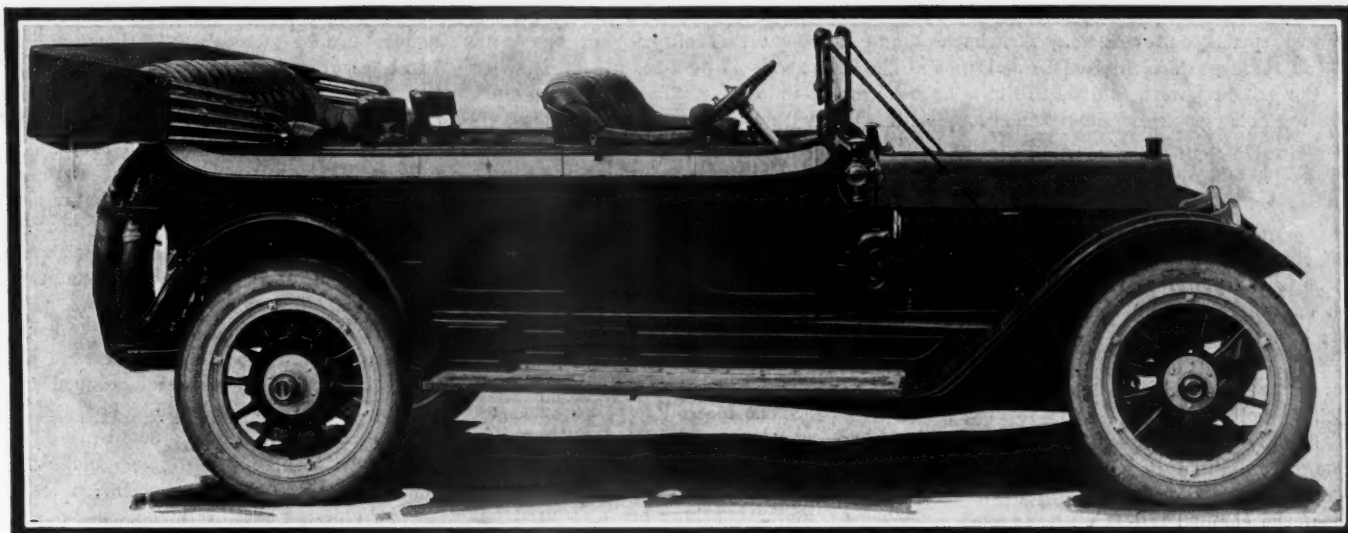
Connecting rods are  $11\frac{1}{8}$  inches in length and composed of chrome-nickel steel. The crank bearings on the big six are  $2\frac{1}{4}$  inches in length and on the little six are 2 inches. The seven-bearing crankshafts have large bearings between the cylinder blocks and smaller bearings between cylinders forming part of the same casting. The smaller main bearings on the big six are  $1\frac{1}{8}$  inches and those between blocks are  $2\frac{1}{2}$  inches. The crankshaft is composed of chrome-nickel steel and supported on the seven bearings lined with Parson's white metal bushings in a stiff and lasting installation.

In the valve action the cams act directly upon the rollers, giving a minimum of linkage with silent and quick action. The tappet guides are lengthened out to prevent a troublesome leakage of oil around this part of the motor. No covers are placed over the valve action, silence being secured by a close adjustment between the tappet and valve stem. A cold clearance of .003-inch is allowed at this point. The cams are cut integrally with the camshaft and hence have no tendency to become loose. The camshaft is driven through the spiral timing set.

The cooling circulation is attended to by a centrifugal pump, located on the right side of the motor. It is shown herewith, near the forward end of the motor, and is operated off the same shaft as the generator. As may be seen from this view, the water intake manifold has been lifted above the generator and runs back just below the exhaust pipe. Cooling is further aided by a six-bladed aluminum fan mounted on a bracket fixed to the timing gear case. The radiator is made larger for this season.



INTAKE SIDE OF LOCOMOBILE LIGHT SIX MOTOR



LOCOMOBILE MODEL 38 SEVEN-PASSENGER TOURING CAR

The ignition system is of the high tension dual type, consisting of magneto, storage battery and coil. The storage battery is used independently for ignition, and consists of three cells providing a current of 6 volts. This same system is used on all three models and is independent of the lighting and starting. The remainder of the electrical equipment is used for the lighting system. It consists of the Adlake dynamo, battery and regulator. The dynamo operates when the motor has reached a certain speed and supplies the current for the lights at that time. The battery takes care of the lights while the dynamo is not in operation. The regulator maintains a constant voltage and protects the lights and filaments. This system is protected from the effects of overload by a fuse system so arranged that they may be easily reached on the removal of a cover plate. The electric horn is also protected by a 10-ampere fuse.

#### New Carburetor Used

Among the innovations for the season of 1913 is the carburetor used on the little and big six-cylinder cars. This carburetor is of the eccentric float type and is heated by either hot air or hot water. The air valve of this carburetor is distinctive. It is provided with two springs, a smaller and stiffer, of which operates only at comparatively high engine speeds. At lower speed the amount of opening is controlled by the larger and weaker spring.

Oiling is accomplished by combination of the force feed and splash systems. The crankcase is made in two parts, the lower forming the oil reservoir and containing the troughs necessary to the splash, and the upper, which is composed of manganese bronze, carrying and supporting the crankshaft and camshaft bearings. The oil capacities for the models M, R and L are  $2\frac{1}{4}$ ,  $3\frac{1}{2}$  and  $2\frac{1}{2}$  gallons, respectively. The main reservoir on the 38 and 48-horsepower motors is carried at the rear of the crankcase casting. From here it is lifted

by the gear pump, driven off the inlet camshaft to a series of leads through the bronze part of the crankcase to each main bearing. The leads are cored through the centers of the web or bridge, carrying the main crankshaft bearing. A hole drilled in the main bearing bushing registers during a portion of each revolution with the opening at the end of the oil lead. During this time oil is forced under the pressure of the pump, against the centrifugal force at this point, and is forced to enter the drilled crankshaft. Following the drilled duct through the crankshaft the oil is led to the lower connecting rod bearings and supplies these copiously with lubricant. Excess oil drains to the splash troughs located below each cylinder and keeps these constantly filled. The output of the oiler, between 100 and 1,000 revolutions per minute, increases directly as the speed of rotation. The output of the pump is such that it will at all times furnish a greater supply of oil than is needed, so that there will be an overflow from the splash troughs back to the reservoir in the crankcase. In order to prevent any bad effects which might

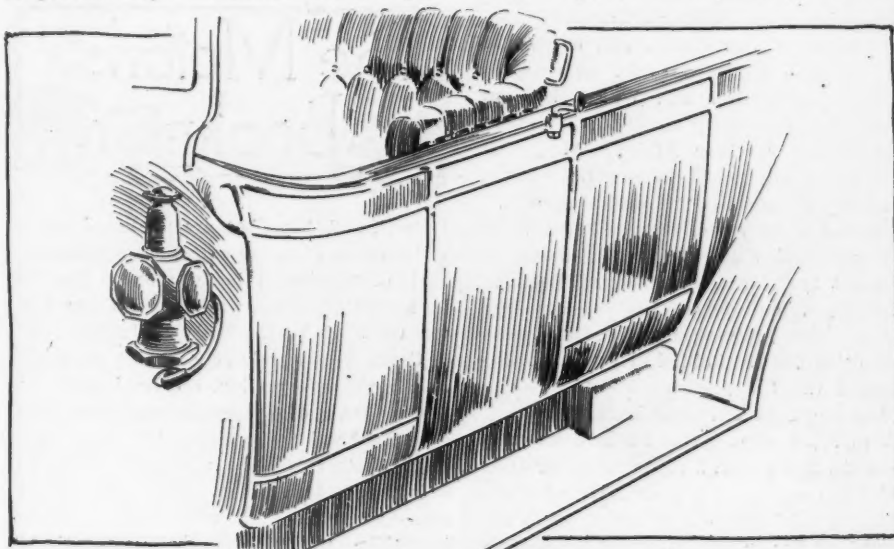
occur from recirculating the oil, wire gauze screens are placed between the reservoir and the circulating oil pump.

#### Electric Starting and Lighting

The starting system is of Locomobile design, consisting of a separate motor, operating in conjunction with the Adlake electric generator lighting system. The motor cut shows the old acetylene starter.

Forty-three hardened saw steel disks are used in the clutch, which is of the conventional multiple disk type, housed within the flywheel. The clutch on the four-cylinder model is a leather-faced cone. The multiple disks on the two six-cylinder cars run in a bath of engine oil and kerosene in equal parts. The driven member of the clutch is supported upon a double row of ball-bearings at the motor end and upon a single large ball-bearing at the other end. A feature of the clutch is the fact that it can be removed from the car without interfering with any other member and any repairs necessary can be made in a correspondingly short time and hence with less expense.

Between the clutch and the gearset is a universal joint. The gearset, which is



CONTINUOUS GUNWHALE AND NOVEL LAMP DESIGN ON NEW LOCOMOBILE



standard for the Locomobile line, has four forward speeds and reverse. The backlash on these gears is limited to .001 inch and the grinding work is done to limits of .00025. This gives a silent and long-wearing gear. Ball-bearings are used throughout and the lubricant to be used is a light gear compound. The capacity of the gearset is 20½ pounds of grease.

A chrome-nickel steel propeller shaft transmits the power to the rear axle. At each end there is a universal joint. The shaft is not enclosed in a torque tube, but there is a deep pressed steel strut, as shown at the head of this description, which is bolted rigidly to the rear axle and flexibly to a cross member of the frame. To lighten it without materially cutting down its strength or rigidity, the web of the channel is left open, as shown in the illustration. Two radius rods take up the drive, allowing the rear springs to be free as far as the drive is concerned and leaving their only duty the easing of the suspension of the car.

#### Floating Rear Axle

The rear axle is bevel driven. Both the pinion and the gear are adjustable and changes can readily be made in the mesh of these two gears. It is of the floating type.

Both sets of brakes are carried on the rear wheels. All the braking stress is taken through the radius rods, none of it is felt by the torque rod or springs. The dimensions of the brakes are 14 inches diameter and 2 inches face for the expanding and 14-7-16 inches diameter and 3 inches face for the contracting. Both sets of brakes are lined with asbestos fabric. The brake adjustments are made by right and left-threaded nuts on the emergency brake and by wing nuts on the service brakes. An equalizing bar is placed across the frame.

The frame is a pressed steel channel bar, 4.5 inches in depth and with a flange ranging between 1.5 and 3 inches in width. The bar is pressed from 3-16-inch stock.

Semi-elliptic springs are used in front and three-quarters elliptics in the rear. The front axle is of I-beam section, with a drop at the center. The spring pads are integral with the upper flange. This axle is drop-forged from a nickel steel bar. A heavy dowel pin passes through the center of the spring and into the front axle to stiffen it against side motion.

Twelve-spoke wood artillery wheels are used throughout. The tire sizes differ for front and rear on the big six and for the three models are as follows:

Model	Front	Rear
M	36x4.5 inches	37x5 inches
R	36x4.5 inches	36x4.5 inches
L	34x4.5 inches	34x4.5 inches

These wheels are all fitted with quick detachable, demountable rims. Timken roller bearings are used for the front wheels. Roller bearings are also used on the steering gear, which is of the worm and full gear type. The worm and gear are so arranged that six adjustments for wear are possible by removing the steering level and turning a hexagonal nut. This brings a new portion of the gear in mesh with the worm and takes up the lost motion which occurs after a long period of use. Both the worm and the gear are case-hardened and if properly lubricated should not require adjustment for a long time. The roller bearings upon which the steering mechanism is carried are adjustable and wear is not likely to occur at that point.

#### New Cowl Design

A refinement incorporated on the 1913 Locomobiles is the cast aluminum cowl which is made a unit with the dash by bolting it to the body sills. This silences body squeaks between the cowl and the dash. Between the body and the frame is a layer of woven cotton belting material, while the doors close against rubber blocks which silence their action and eliminate rattles. The drop-forged rear tire brackets are made a unit with the frame of the car, so that there is a great amount of extra strength in these parts and they are

not apt to shake loose. A refinement which may be mentioned is that the exhaust is carried out behind the car and is not allowed to escape beneath it. The muffler is very silent and is made up of a series of concentric, perforated tubes.

The 1913 cars are equipped with a single-cylinder air compressor, having a bore of 2½ inches, and a stroke of 2½ inches. It is mounted on an extension of the front end of the transmission countershaft, and driven by means of jaw clutches, which can be thrown in and out of engagement by a T-handle, located on the left side of the car and reached by opening a door in the running board side shield. By drawing handle outward about 3-16 of an inch, advancing one notch to the left in a serrated segment, releasing jaw clutches are interlocked, and pump is ready for use.

#### Power Tire Pump

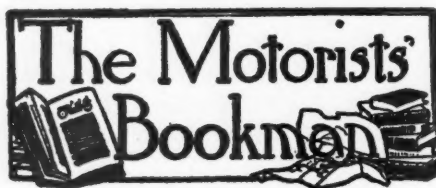
Air is drawn into cylinder through holes drilled around same below radiating fins. Foreign matter is excluded by means of a removal screen. On the upper stroke of the piston the air is forced out of the cylinder by unseating a flat valve into a small tank placed at the right of the air compressor, and mounted in front of the transmission carrying channel. The purpose of this tank is to overcome the pulsation of the pump only, and not to act as a reservoir. By means of a two-way fitting air is drawn out of the tank through a delivery tube leading to a fitting which projects through the left side member of the frame adjacent to the T-handle mentioned above. One end of the tire hose is screwed on to this fitting when tires are to be inflated. The location of the two-way fitting, on the tank is such that any sediment or oil falls to the bottom of the tank, and is not drawn out through the delivery tube. With the motor running at normal speed the air compressor will inflate a 37 by 5-inch tire to 90 pounds pressure in about two minutes, it is said.

#### Clever Book on European Travel

FULL of piquant humor and unique description is the sketchy account by Louise Closser Hale and Walter Hale of their trips through the countries of western Europe and northern Africa. Altogether different from books in general on the subject of travel, "Motor Journeys," possesses a very individual charm while the practical side of such touring is handled from the viewpoint of repeated experience, and the subject covered logically. The volume is well illustrated. Net price \$2.00. Published by A. C. McClurg & Co., Chicago.

#### Guide Books of Ohio and Indiana

Two more motor guide books have come from the Scarborough press, covering Ohio and Indiana. They are uniform with the guide to Michigan motor roads which appeared earlier in the season at the instigation of the Wolverine Automobile Club of



Detroit, and, like that, are published under the auspices of motor clubs, the Automobile Club of Cincinnati being sponsor for the book on Ohio roads while the Hoosier Motor Club of Indianapolis is for that of Indiana. Each volume contains considerable route information, sectional maps on a good scale of the entire state and city maps; a hotel and garage directory and a brief abstract of the motor car laws of adjoining states. They are well indexed and are convenient in form and size, making them handy when touring entirely within the state. They may be had either

from the clubs named or from the Scarborough Co., Indianapolis, Ind. Price \$1. Florida—A Winter Playground

A book containing much of interest to the motoring tourist, if Florida be within his touring radius, although not written especially for him, is "A Guide to Florida," by Harrison Rhoades and Mary Wolfe Dumont. Bits of the history and romance of this enchanting land of sunshine and flowers, something of its sports, its game laws, a chart of temperatures containing data covering a number of years, its rail and waterway facilities, a brief table of the most important motor car records made at Daytona beach since 1904, a list of hotels and boarding houses, women's clubs and a bibliography of the state are to be found in this handy volume, which also contains many half-tone illustrations and three folding maps. Dodd, Mead & Co., New York.

# Peugeot's Three-Point Suspension

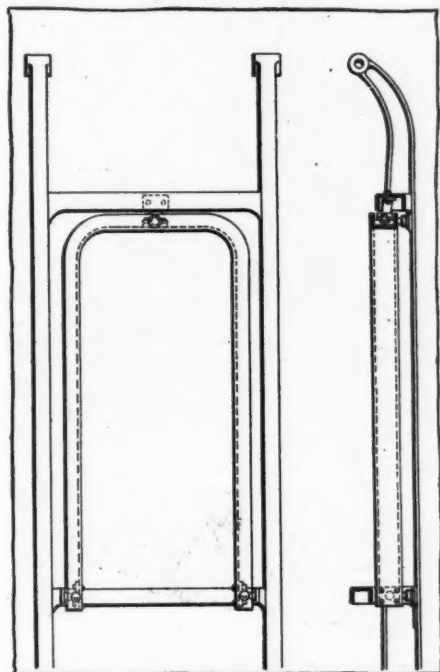


FIG. 1—THREE-POINT SUSPENDED SUB-FRAME USED ON PEUGEOT RACER

**T**RUE three-point suspension is found on the 175-horsepower Peugeot racers, recognized as the fastest European cars of the 1912 season. As already explained in a description of these racers published in the issue of this paper on September 26, the entire power plant—motor, clutch and gearset—is carried on an elongated U subframe. There is so little transverse rigidity in the subframe that it would be possible to make the two ends meet without any great effort. The necessary rigidity, however, is given by the motor base and the gearbox.

When disassembling, the entire plant with its subframe is taken out of the chassis; the different organs are put together on the subframe, and the rigid block thus formed is fitted into the frame. It is this entire block which is three-point suspended, there being a central trunnion attachment to a very substantial double transverse frame member at the front, and ball-and-socket attachments at each end of the frame, all three attachments being provided with lubricators. The entire power plant is so completely isolated from the twisting strains imparted to the frame members that it has not been found necessary to place a universal joint between motor and gearbox.

The valve-operating mechanism is a very

distinctive feature of these racers. There are four valves per cylinder inclined in the head at an angle of 45 degrees, the two camshafts being overhead and in independent aluminum housings, these housings being secured on long studs projecting from the cylinder heads.

A complete camshaft with its housing and pinion is shown in Fig. 2. Each camshaft is cut integral with its eight cams, each cam operating within an eccentric shown in Fig. 3. One of these eccentrics is for the intake, the other for the exhaust. It will be noticed that this piece of mechanism comprises the valve pushrod, with an adjustable head, and in the same plane a stem receiving the light coil spring to assist the return of the push rod. In Fig. 4 a diagram is given of the camshaft within the eccentric.

It will be noticed that the roller is set in the face of the cam itself, and that the entire mechanism is retained within the camshaft housing. Thus, the entire camshaft can be lifted away by removing the holding-down nuts without disturbing the timing. The adjustable heads of the pushrods serve in a certain measure to vary the timing of the valves. With a cylinder bore of 4.3 inches and a stroke of 7.8 inches, the diameter of the valves is 2.36 inches, with a lift of .43 inches. Each camshaft is operated by a vertical spindle and bevel gearing at the front end of the motor. A completely hemispheric combustion chamber is formed, with the spark plug in the center of the head.

The form of the chamber is such that there is practically no danger of a broken valve falling onto the piston, unless, indeed, the break occurred practically flush with the head. Light BND steel pistons are employed with two rings to each. The average tolerance of the pistons is 4/10 millimeter; the diameter varies throughout the length, being greater at the base than at the head.

Lubrication of the motor is under high pressure throughout. Figures cannot be revealed. The lower portion of the crank-chamber has three vertical divisions forming four independent chambers, with a common oil sump, the base of which is ribbed. In the center of each of these four chambers is an opening communicating with the sump below. All the oil leads are internal and consist of steel tubes brazed in position in the crankchamber; they lead the oil direct to the five main bearings, then through the bored

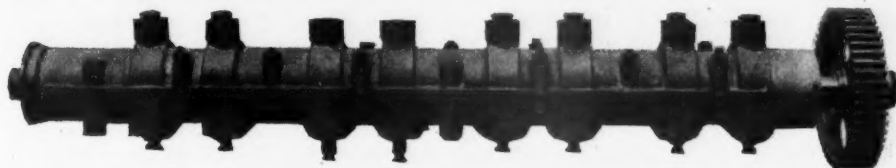


FIG. 2—COMPLETE CAMSHAFT AND HOUSING

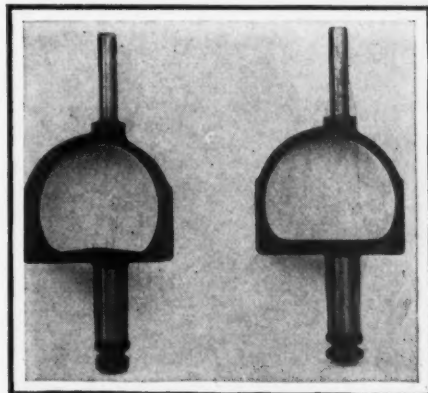


FIG. 3—VALVE LIFTERS USED ON PEUGEOT

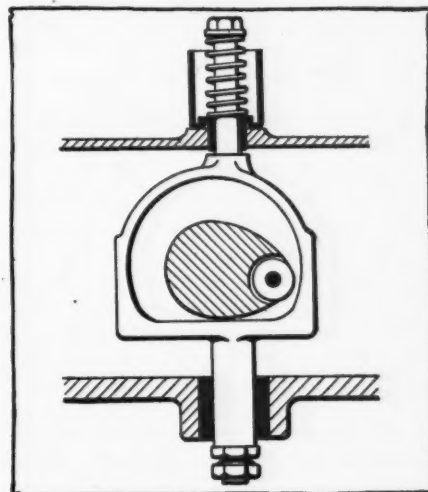


FIG. 4—DIAGRAM OF VALVE-OPERATING MECHANISM

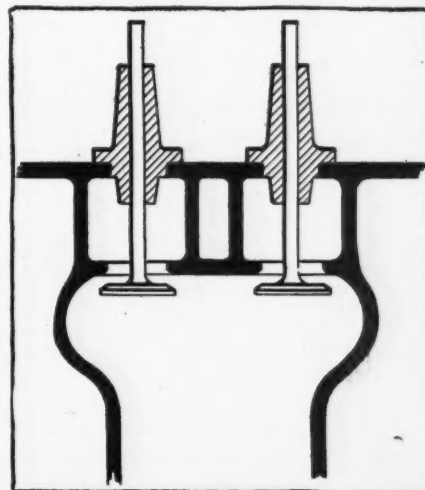
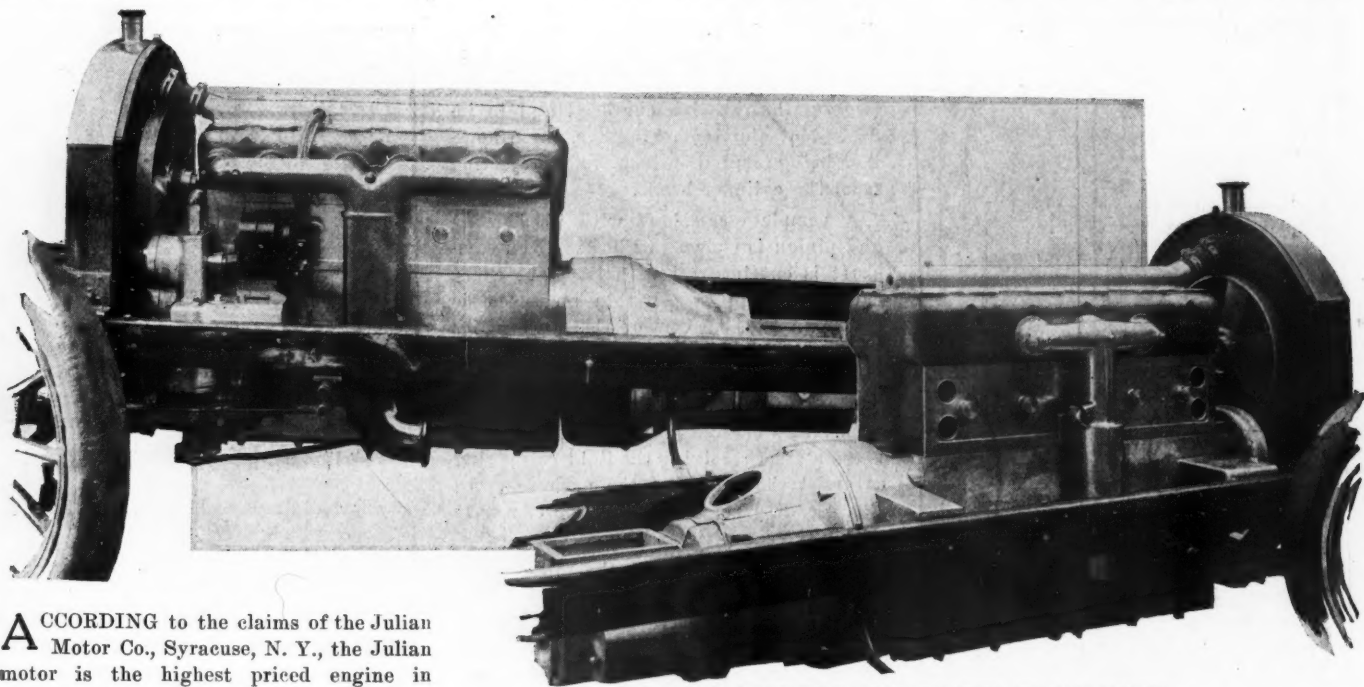


FIG. 5—FORM OF COMBUSTION CHAMBER, PREVENTING BROKEN VALVE FALLING ON PISTON

crankshaft to the connecting rod ends and up the connecting rods to the wrist pins. There is only one joint in the entire system, this being the cone seating of the pump. Leakage therefore is impossible.



# Julian Motor, a Product of Refinement



INLET AND EXHAUST SIDES OF NEW JULIAN MOTOR

**A**CCORDING to the claims of the Julian Motor Co., Syracuse, N. Y., the Julian motor is the highest priced engine in America. Illustrated herewith is the large six-cylinder model which is typical of Julian construction. The other two motors have been brought out since the introduction of this motor. They are a four of the same general dimensions as the large six, and a 3¼ by 6-inch six. These motors have followed the same general lines as laid down by the parent model which was designed with the aim of producing a motor complete in each particular for use in motor cars of the highest type, wherein expense is put practically out of consideration, and to conform to the best ideals of accessibility, simplicity, and flexibility. In no particular has accessibility been sacrificed to simplicity, for the motor was designed especially for the use of private owners who desire to operate their own cars.

## Only Two Bolt Sizes

Among the features that are especially emphasized is the fact that in the entire power plant, but two sizes of bolts and nuts are used, so that two wrenches suffice for all repairs and adjustments. All parts have been so disposed about the assembly as to be available for instant access, and yet the lines of the motor are the extreme of simplicity. An exceptionally long stroke is also featured that should provide reserve power far in excess of what is ordinarily to be expected of a motor of its dimensions. The motor for this reason, although of six cylinders and 100 horsepower, is extremely compact, and will consume no excess of space in the chassis.

Another feature of great importance is the light weight of the reciprocating parts, and of the motor as a whole. Especial attention has been paid to this consideration in an exceptional degree of detail refine-

ment. To attempt to enumerate all of the notable features would be to describe the motor, for very little attention has been paid to orthodox practices. The special features, therefore, will be brought out as they occur in the ensuing description:

The design is essentially of the unit type, as the cylinders, inlet manifold, valve housing and water passages have been cast integral. The crankcase, flywheel-housing, support arms, mud-pan, and several additional features are all contained in a single aluminum casting. There are six cylinders, of the T-head type, with exceptionally large valves. The bore is 4½ inches, and the stroke is 7 inches. The valves are 3¼ inches in diameter, with a lift of ¾-inch. The bevel of the valve seats is much flatter than is usual, being 30 degrees from horizontal. The valve stems are tubular, to facilitate cooling and to make for lightness. They are of carbon steel, ½ inch in diameter, and electrically welded to the nickel steel heads. They are disposed in guides of unusual length, and bear on square pushrods. These pushrods are, like the stems, hollow, and are further lightened by holes that are drilled through each of their sides. They are of nickel steel, hardened and ground, and are secured in special guides of cast iron, which are ground, and the pushrods are lapped in by hand before assembling. A dash-pot is disposed at the end of the pushrods to prevent their jumping, and to thoroughly lubricate the tappets.

## Convenient Camshaft Construction

The camshafts may be removed from the front of the motor without removing the bearings, which are of such diameter that the cams may slip through them.

Compression relief is effected by a small compression relief handle at the front of the motor, which pulls the exhaust camshaft forward, raising all of the exhaust valves by means of small auxiliary cams. Both sets of valve-mechanisms are completely inclosed by flush plates, secured by four thumb-screws on studs, which pass completely through the motor from the inlet to the exhaust sides. The inlet valve inclosure serves a double purpose. Four screened holes admit air into this inclosure, where it is thoroughly warmed before passing to the air-jacketed carbureter. This pre-heating of the air does away with water-jacketing the carbureter, and all water pipes and connections are eliminated.

## Light Reciprocating Parts

The pistons are extremely light, weighing with their wrist pins but 4¾ pounds apiece. This light weight is noticeable all through the motor, as the connecting rods weigh but 3 pounds, complete, with their bearings. The total weight of the reciprocating parts of each cylinder is thus but 7¾ pounds. The pistons are 6½ inches in length, and the connecting rods 14 inches long and of I-beam section. All bearings are of unusually liberal size. The main bearings are 2¼ inches in diameter and four in number, while the camshafts are supported on seven bearings, 1⅞ inches in diameter and 2 inches long, with the exception of the front bearings, which are 3¼ inches in length.

The crankcase is a single casting and incloses the flywheel, supports the motor from the frame, and has cast integral with it, two tanks for oil and gasoline, respectively, which are webbed to the rear

support arms, making a mud-pan unnecessary. The oil reservoir is bolted to the bottom of the crankcase, and by its removal the pistons may be taken out without disturbing the cylinders or the main bearings, owing to the long stroke. The main bearings are secured to the crankcase by the same bolts that retain the cylinder block, so that no strain is borne by the crankcase, as it acts merely as a washer between the cylinders and the crank journals. The wrist pin, which is hollow, is secured to the piston in the usual manner, and the connecting rod is connected therewith in an original manner, adjustment being provided for without the use of a bearing cap, for the upper portion of the connecting rod is one piece, being slotted, and provided with a clamping bolt to take up wear.

#### Regulation of Oil Level

Lubrication is by the usual circulating splash system, but with several new features. Oil is carried in a sub-base, into which the oil in the splash troughs drains. Baffle plates are used to deflect the oil to the right side of the motor and to prevent it rushing to the rear on grades. The oil level is maintained by small drain holes at the front center of each dip-trough, which at low speeds maintains the level of oil below them, but which are of such small size that at high speeds the oil is fed faster than it is drained, so that its level is raised according to the speed of the motor. An additional oil supply is carried in a reservoir, cast integral with the crankcase, on the exhaust side of the motor, which holds  $1\frac{1}{2}$  gallons, as a reserve supply. The oil is fed from this tank to the main reservoir by pressing a button. The oil pump, which is driven from a vertical shaft at the front of the engine, feeds the oil to the main bearings, overflowing into the splash pan. Oil enters each crank-pin at four points, for the purpose of lubricating the crank-pin bearing.

Corresponding to the auxiliary oil reservoir is a gasoline tank, located on the inlet side, and containing 1 gallon. Fuel is fed to this tank from the main supply by gravity only, where it is warmed before feeding to the jackets direct, without piping,

fore passing down to the carburetor. On ascending grades, the tank being forward of the motor, the feed is constant, and the 1-gallon capacity of the tank suffices to supply the carburetor with sufficient fuel to climb the longest grade, even though the grade be such that none is fed from the main supply to the auxiliary tank.

The same vertical shaft that drives the oil pump also is used to drive the water pump and magneto. The water pump and the return to the radiator is very short and direct. A six-bladed belt-driven fan serves to cool the radiator. The magneto is mounted in an especially interesting manner, which permits it to be removed by merely loosening a thumb-screw at the base, and turning the slots of the coupling to horizontal, when it may be slid out of its mounting. All cables from the magneto are encased in a conduit which conducts them from the magneto to an inclosed and invisible spark-plug chamber situated at the top of the motor.

No grease cups are used, and there is but one stuffing-box in the entire motor. This latter is the stuffing box at the rear of the crankshaft. The clutch housing is bolted direct to the flywheel housing, and to it in turn is bolted the gearset, making a rigid unit of the whole. The clutch, furnished is of the multiple-disk, dry-plate type, consisting of fourteen steel driving disks, and thirteen raybestos-faced disks. Either a three-speed or a four-speed gearset can be furnished, with or without controls. In the motor shown a three-cylinder air motor was installed for compressing air and starting. With the motor running this mechanism is used as an air-compressor, geared at 1 to 1, to the transmission shaft, while for starting it is turned into a compressed air engine, using the air which it has compressed and stored to turn the transmission shaft at a speed of 14 to 1. An electric motor generator will be installed in a similar manner for those who prefer it.

#### COAL AS A MOTOR FUEL

That coal is adapted to internal combustion engines as well as external combustion engines, is not generally conceded, as the mineral character of its body seems

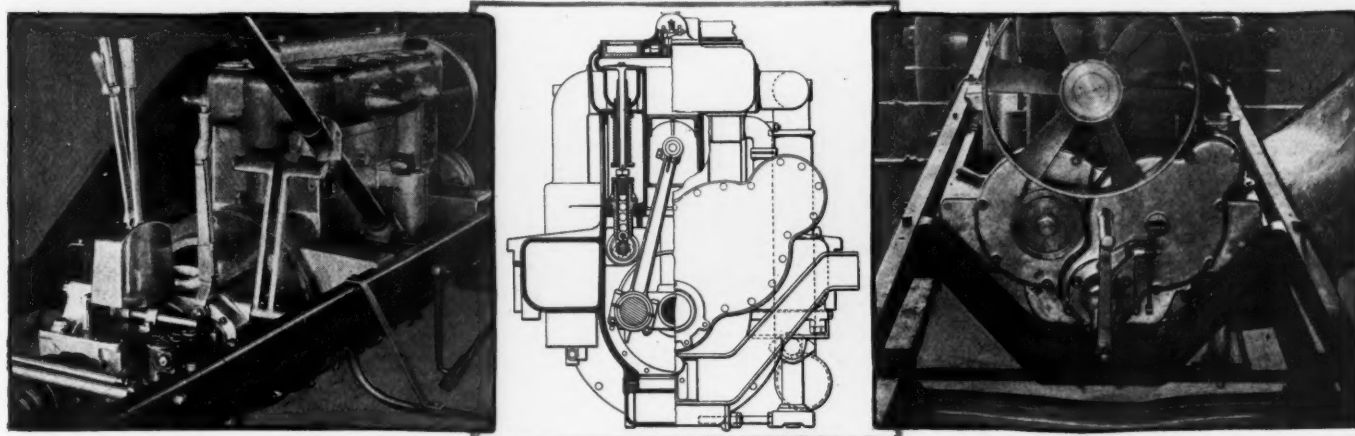
to preclude its introduction into the interior of the cylinder. But the fact remains that coal has a very high fuel value, that it is readily combustible, and that in the form of a gas is little affected by temperature, or other conditions that would naturally cause the condensation of liquid fuels.

However, it has been demonstrated by Deisel in his high-compression engine, that coal, injected into the cylinder at a compression above 500 pounds to the square inch, will produce power as well and more economically than will crude oil. The surprising fact is that the coal dust, while in granules no smaller than granulated sugar, did not score the cylinder, because of the practically complete combustion effected by the high-efficiency type of engine. But the Deisel engine is of great weight and bulk, and while coal is demonstrated by this engine to be adaptable to use in the internal combustion engine, it is not proven suitable for motor cars.

#### Low Coal Engine

A. M. Low, whose high-efficiency gasoline engine caused so much comment recently, has come forth with a coal engine which he claims is not only applicable to light road vehicles, but that may actually be used on a motor cycle. He already has produced two engines of different types, in the course of 7 years of experiment, each of which has developed power from coal as a fuel. The first experimental engine was of the horizontal stationary type, and developed 2 horsepower. The second was designed for 100 horsepower, although no attempt was officially made to attain the full power of the engine it developed above 40 horsepower.

Two more engines are in the course of construction, one 80 to 100 horsepower, of the horizontal stationary type, and another which will be either of the V-type or tandem, of four cylinders, to conform to the requirements of ordinary motor cars. The former is intended to compete with producer-gas engines, while the latter will be experimented with on motor cars. The Low principle of cooling the engine with the fuel before use is employed in the coal engines.



COMPOSITE SECTION AND FRONT AND REAR DETAILS OF JULIAN MOTOR





# Development Briefs



## Detroit Auto-Heater

THE Detroit Auto-Heater differs from other types of exhaust heaters in that the exhaust gases pass through the muffler whether they are used in the heater or are exhausted direct, and in the fact that light flexible steel tubing is used to conduct them from the exhaust line to the heaters instead of rigid pipe. No auxiliary muffler is needed with this device, as both the outlet and return to the exhaust valve are under the body.

The heater itself consists of two tubes, the outer of which is of wire mesh to protect the clothing from contact with the hot portions, yet permitting free radiation. The inner tube is of sheet steel, deeply corrugated, to give the maximum of radiation, and is divided into two sections. Two flexible steel pipes connect it with the heater valve on the exhaust pipe. This valve is of the butterfly type, and in closed position allows a free passage of the gases from the motor direct to the muffler, but when open deflects the whole of the exhaust through the flexible tubing to the heater and back to the other side of the valve, from whence it escapes through the muffler.

The ends of the heater are packed with asbestos and secured by an expansion bolt. This bolt on a part of its length is crimped, which permits it to expand and contract. Two or more of the heaters may be connected in a series, as shown in Fig. 3. This figure also shows a section of the heater valve, which is controlled by a regulator in the driver's compartment. Fig. 2 illustrates the exterior appearance and interior construction of the heater. It is the product of the Detroit Auto-Heater Co., Detroit.

## Huston Multiple C-Spring

Designed to take the place of the usual three-quarter elliptic spring, the Huston Multiple C-spring is offered by the Huston Multiple C-Spring Co., Philadelphia. The spring differs from the standard type in that the upper leaves of the top section do not end above the rear shackle, but extend over and beyond it in a large curve to a triple shackle below the main shackle. This shackle, in turn, is hung on approximately the middle leaf of the lower spring, so that the whole assembly

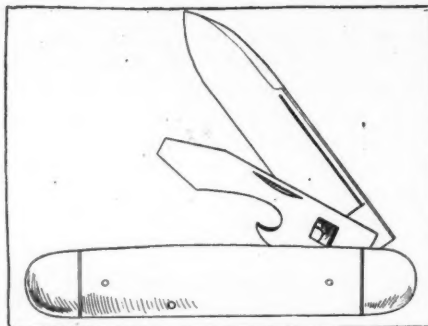


FIG. 1—EMPIRE KNIFE

constitutes in reality two springs. The ratio of the length of the lower leaves of the lower spring to the upper leaves of the top spring, and that of the up-

per leaves of the lower spring to the lower leaves of the top spring, differ greatly. This results in a compound action of the springs for which great claims are made by the manufacturers. The length of the spring is greater for a given space than that of the three-quarters elliptic type. The three extended leaves of the upper C-spring are separated and joined to a pivoted compensator which is designed to equalize the varying strain on the three leaves. They are separated throughout their length, being thus able to act without friction.

The two sets of springs acting at different periods of deflection, owing to the difference in the relative length of their components, act as checks upon one another, so shock absorbers are said to be unnecessary. The compound action is furthermore said to be resilient throughout a greater period of deflection, and therefore to be as easy with a light as a heavy load.

## Empire Knife

Fig. 1 shows a knife that is especially designed for the use of motorists. It is the product of C. E. Miller, New York, and com-

combines in the proportions of an ordinary pocket knife the qualities of a knife, a screwdriver, a Prest-O-Lite tank key and a bottle opener in one. This knife is catalogued as No. 373 and has two blades. The largest of these is a plain knife blade, while the shorter is provided with a screwdriver point, a square socket near the joint that is designed to fit the cocks of a gas tank, and a hook on the side for the purpose of removing metal bottle tops.

## Ford Radius Rod Socket

Designed for attachment at the rear end of the radius rod which extends back from the front axle on Ford cars, a ball socket has been produced by the Auto Parts Co., Providence, R. I. This socket is spring retained, and is for the purpose of automatically taking up wear, and for the prevention of rattling. This radius rod is provided with a ball end, and by removing the cap that is regularly supplied with this car, the special socket may be applied, it is said, in ten minutes. The socket is in the form of a spring plunger with a cup-shaped bearing, within a cylindrical casing.

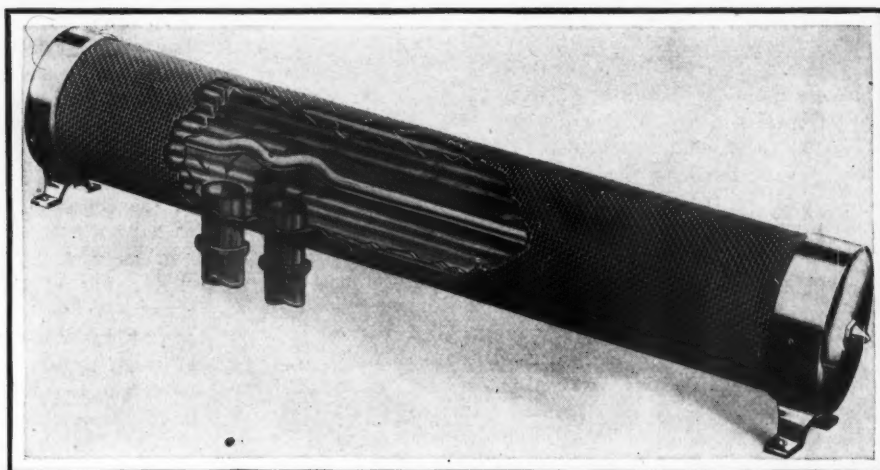


FIG. 2—DETROIT AUTO HEATER

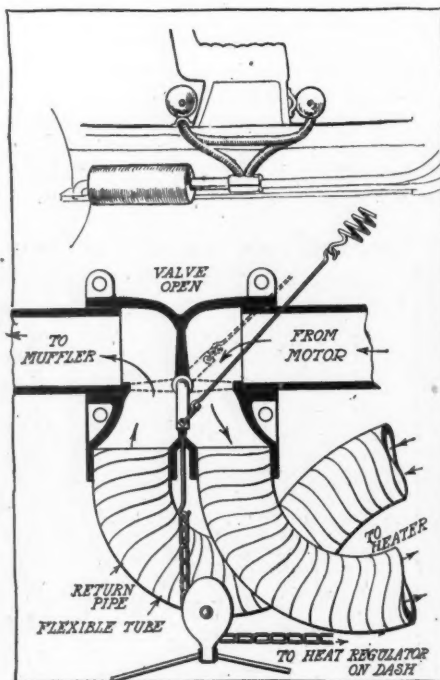


FIG. 3—GENERAL PLAN AND DETAIL OF VALVE



# The Motorist's Kindergarten

**EDITOR'S NOTE**—Motor Age is publishing in this department a series of non-technical explanations of the various parts of motor cars for the benefit of the reader who knows nothing about them. The subjects will be dealt with in the most elementary manner, so that the series when completed will form a simple elucidation of the car. The first article appeared October 10, 1912.

**B**OTH types of cells described before, the wet cell and the dry cell, are what are known as primary cells. This means that they are the original or primary sources of the electric current. There is, however, another kind of cell which is even more common in motor cars than the dry cell. This is the storage cell, several of which in combination make up the ordinary storage battery.

Storage cells are of the type called secondary cells because instead of being the primary source of current, like the dry cells, these will not give up any current unless electricity has first been put into them. Storage cells are simply a reservoir of electric current and have to be filled up when they are empty of electricity. We fill them up by connecting them with a power circuit, say the house lighting system. This is called charging, and when the cells are full they are said to be charged. Now with the storage battery charged, we can use the current from it to ignite the engine or light the lamps on the car in just the same way as if it was a dry battery, with the additional advantage that the storage battery will last longer and can be filled up again when it has run out. When we use the storage battery to supply current we say we are discharging it, and when it is empty it is said to be discharged. Then all we have to do is charge it again. It is known as the storage battery usually, but other names such as accumulator and secondary cell have been applied to it.

## Storage Batteries

The storage battery, although appearing in many different forms, is in every case essentially the same. It usually consists of two lead plates or grids, as they are sometimes called, and one form of plate is shown in Fig. 28. The indentations on the plates are filled with oxide of lead in the case of the positive plate and with spongy or finely divided lead in the case of the negative plate. These plates are placed in a glass jar containing dilute sulphuric acid, which is sulphuric acid mixed with water. Usually a number of the positive plates and about the same number of negative plates are placed in the acid instead of just one of each. The battery with the plates in position resembles the one shown in Fig. 29. All the positive plates are then connected and all the negative plates connected and the two wires brought out to two separate terminals. The heavy lines indicate the connection of the different sets of plates. The places of fastening the ends of the connecting wires are known as lugs and marked + and - Fig. 30. As soon as these plates have been connected in the glass jar containing the sulphuric acid a chemical action is set up for a short time, which results in a film of sulphate of lead depositing on both plates and the chemical action then stops because lead sulphate covered the plates. No action takes place until an electric current is passed through the battery. The electric

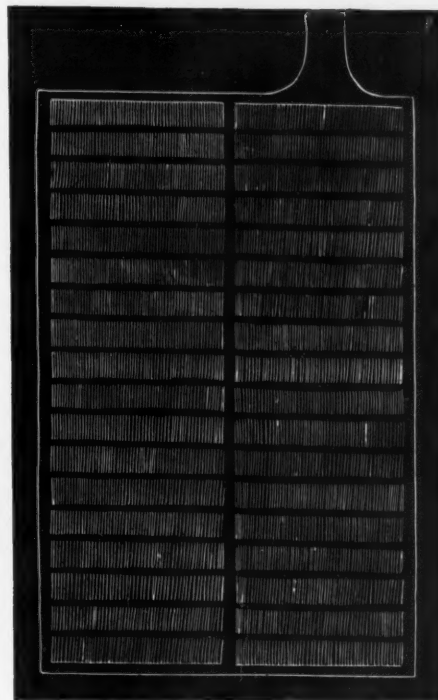


FIG. 28—A TYPE OF LEAD STORAGE CELL PLATE

current that is passed into the battery decomposes the sulphuric acid, or, as it is called, the electrolyte, into hydrogen gas and sulphur dioxide gas, which is sulphur and oxygen combined. When a sulphur match is burning sulphur dioxide is evolved and the pungent, penetrating odor is given off. The same kind of gas with the same odor is given off when the sulphuric acid is decomposed or broken up by the electric current. The hydrogen of the sulphuric acid passes to the negative plate or the plate with the spongy lead on it, and the sulphur dioxide goes to the positive plate. When the sulphur dioxide reaches the positive plate a chemical action takes place between it and the film of lead sulphate on the plate, and a little acid is formed. The hydrogen that went to the negative plate causes some more acid to be formed. Now the plates are clean again. By clean is meant that there is no sulphate of lead on them. But the sulphuric acid in the jar will act on the lead plates and this causes an electric current to flow just as in the primary cell. But as it is said the battery soon is exhausted, which means that the plates have become full of sulphate of lead and the chemical action has stopped. When the action ceases the battery is recharged and the same thing happens as before.

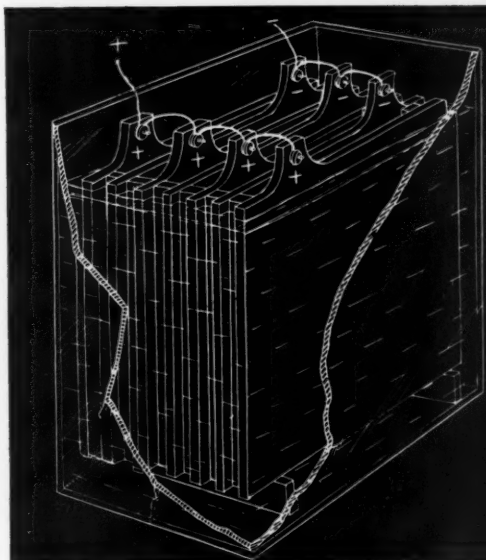


FIG. 29—ARRANGEMENT OF PLATES IN STORAGE BATTERY

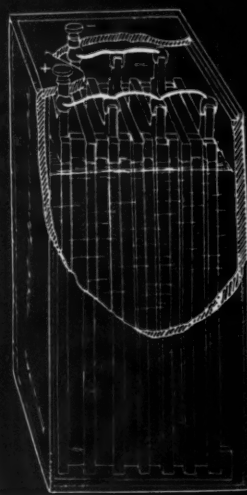
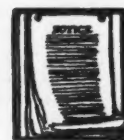


FIG. 30—SHOWING PLATES CONNECTED TO LUGS





# Brief Business Announcements



**SEATTLE, Wash.**—The Standard electric has appeared on Seattle's row represented by the Electric Sales Co.

**New York**—The W. G. Nagel Co., 28 St. Clair street, Toledo, O., has become a Bosch distributor.

**Chicago**—The Kelly-Springfield Motor Truck Co. announces the appointment of L. B. Garrison as manager of its Chicago branch.

**Elkader, Ia.**—Ray Bush and Louis Bushing, formerly employed with the Waterloo Auto and Supply Co. of Waterloo, has become interested in the Elkader Auto Co.

**Washington, D. C.**—The Airease Tire Filler Co. has removed its offices from the Southern building to the corner of Pennsylvania avenue and Fourteenth street.

**Seattle, Wash.**—Henry E. Schmidt is named as the new manager of the Kelly-Springfield company, which has established a northwest factory branch at 511-13 East Pike street.

**Minneapolis, Minn.**—Charles S. Marshall, who has taken the northwestern agency for the Racine tire, has opened a new office at 911 First avenue South, under the name of the Marshall Racine Rubber Co.

**Syracuse, N. Y.**—Jones & Pimmat, manufacturers of accessories including tops, have completed their new factory, which is of cement block construction, cement floors and steam heat, with electric lights at each workman's bench.

**Baltimore, Md.**—The Heinz Motor Co. has been organized to handle a line of supplies and accessories. Bert Heinz is president and general manager. The firm will occupy the building at 533 North Howard street.

**Columbus, O.**—Frank Corbett has taken the whole distributing agency for the Detroit for the entire state of Ohio. He has located a sales room and office at 246 North Fourth street. The local agency for the Detroit in Columbus is taken by the Patterson Auto Garage Co.

**Wilmington, Del.**—The T. C. Bradford Auto Co. has taken possession of the Postles garage, adjoining its garage, at Tenth and Tatnall streets, and is occupying both, additional room having been required since the company inaugurated a taxicab service.

**Montreal, Que.**—The Matheson Automobile Co., of Canada, Ltd., with a full paid up capital of \$50,000, all common stock, has been formed. The company is Canadian distributor of the Matheson and Auburn. The sales organization is under charge of J. Scott Innes, late sales manager of the

Schacht company, supervising the territory east of Manitoba, and G. C. Murray, late of the Buick company, the west.

**St. Louis, Mo.**—The new building of the Heimsch Automobile and Repair Co. of St. Louis is completed. It is located at 2914-16 North Grand avenue.

**Chicago**—H. C. Maibohm has disposed of his interests in the Motor Supplies Co. and is contemplating a 2 months' vacation trip to southern California and the Panama canal zone.

**Cleveland, O.**—H. R. Karnaghen has severed his connection with the Swinehart company as branch manager here, to assume a position with F. G. Carnahan & Co., Akron, O.

**Columbus, O.**—Levi R. Smith, head of the Hudson Sales Co., 241 North Fourth street, Columbus, died at the age of 56. He was one of the early dealers in the Buckeye capital.

**Columbus, O.**—The Electric Garage Co. is the name of a new concern which has taken over the business formerly operated by Harry Joseph at 160 South Champion avenue, Columbus. The new concern consists of Harry Joseph, E. Evans and H. Cavendish.

**Philadelphia, Pa.**—W. R. Larnes, local branch manager of the Goodyear Tire and Rubber Co., 207 North Broad street, has been promoted to the new post of district supervisor over the six factory branches of the Goodyear company, located in Philadelphia, Pittsburgh, Scranton, Baltimore, Washington and Richmond, with his

## Recent Incorporations

**Pittsburgh, Pa.**—Keystone Motor Supply Co., capital stock, \$12,000; to manufacture and deal in motor cars; incorporators, R. V. Campbell, C. H. McDonald, E. H. Bledringhas.

**Fairchild, Wis.**—Fairchild Motor Co., capital stock, \$2,500; incorporators, R. D. Shipman, C. C. Calkins, F. N. Ferguson, F. N. Stillman.

**Cleveland, O.**—Anderson Rolled Gear Co., capital stock, \$100,000; to manufacture and deal in machinery and supplies; incorporators, F. A. Barker, D. H. Foster, W. G. Kirkbride, H. N. Anderson, G. H. Sensabaugh, R. M. Calfee.

**Toledo, O.**—Kero Carburetor Co., capital stock, \$25,000; to manufacture and deal in carburetors; incorporators, M. O. Rettig, W. J. Bruun, H. C. Lyon, M. C. Arndt, W. H. Bugman.

**Cleveland, O.**—Euclid Square Garage Co., capital stock, \$25,000; to operate storage rooms and conduct livery business; incorporators, C. K. Fauver, J. A. Harris, S. A. Pritchard, H. E. Downing, H. Allchin.

**Cleveland, O.**—Alco Motor Co., capital stock, \$10,000; to deal in motor cars; incorporators, M. Kluger, C. K. Halle, Frank Butler, A. J. Halle, E. L. Geisner.

**Cleveland, O.**—Forest City Garage Co., capital stock, \$5,000; to deal in motor cars and accessories; incorporators, C. Mertz, E. T. Mertz, James T. Harding, John W. Wald.

headquarters in this city. W. F. Powers will succeed Barnes as local branch manager.

**Fostoria, O.**—The Allen Motor Car Co. has been formed at Fostoria and will manufacture cars.

**Worcester, Mass.**—H. W. Munyan, has been made manager of the branch of the Fisk Rubber Co. in this city.

**Minneapolis, Minn.**—W. R. Hoppin, formerly with the R. C. H. Corporation, has been placed in charge of the electrical division for the Fawkes Automobile Co., which carries the Ohio electric car, as well as a line of gas cars.

**Indianapolis, Ind.**—G. M. Bicknell, formerly foreman of the final test of the American Motors Co., has become district sales manager for the Carter Carburetor Co. of St. Louis.

**Detroit, Mich.**—The Crescent Air System Co. of Detroit, which manufactures the Crescent Air System for motor cars and boats, has moved to larger and more commodious quarters at 1199 Woodward avenue.

**Portland, Ore.**—H. R. Roberts, for some time past manager of the Portland Motor Car Co., has been made manager of the direct factory branch of the Winton in Portland. The branch will be located at Twenty-third and Connell road.

**Baltimore, Md.**—The Garrison Garage Co. has been organized and is building a new garage at Garrison and Duvall avenues. The garage will be 165 by 122 feet, will be one story high, fireproof and cost \$12,000.

**Worcester, Mass.**—The Maykel Automobile Co. has been formed in Worcester, with a capitalization of \$12,500 and the officers are Mitchel K. Maykel, president and treasurer and M. L. Katz and A. Massard, directors.

**San Francisco, Cal.**—The E. Stewart Automobile Co., northern California agents for the S. G. V., has moved into temporary quarters at the corner of Van Ness avenue and Fell street.

**Indianapolis, Ind.**—Lew W. Ellingham, Indiana secretary of state, has certified the Stewart-Warner Speedometer Corporation to do business in Indiana, where it has \$15,000 of its capital stock represented. The company is incorporated under the laws of Virginia, with \$11,000,000 capitalization.

**Washington, D. C.**—The Warren agency has been transferred from the Warren Motor Sales Co. to W. P. Barnhart & Co., who also handle the Standard electric. The Warren Motor Sales Co. has been dissolved and a new company formed known as the Washington Auto Service Co., with a salesroom and garage at Fourteenth and W

streets. The Hupmobile will be handled by the new company, of which Charles H. Kloppmeyer is general manager.

**Newark, O.**—The C. W. Thompson Mfg. Co. has been taken over by W. A. Tungs and will be rehabilitated and extended. The company makes a patent tire clamp.

**Minneapolis, Minn.**—The Colby Motor Co. has removed to its newly erected building at 1521 Hennepin avenue. The factory branch is in charge of H. A. Walch, A. M. Walch and L. P. Werges.

**Columbus, O.**—The Johnston Sales Co. of Columbus, recently incorporated to act as central Ohio distributor for the R. C. H. line, has opened a salesroom at 115 North Wall street. N. M. Johnson is general manager.

**Depere, Wis.**—The Depere Motor Car Co., owned by Joseph Hallett and Bertrand Miller, has been dissolved, Mr. Hallett continuing the business, also becoming manager of the Toonen & Berlamant Garage Co. on George street.

**Columbus, O.**—The Snyder Automobile Co., Columbus agent for the Abbott-Detroit, has moved to 162 North Fourth street. The old place on East Long street will be continued as a storage room and salesroom for second-hand cars.

**Phillips, Wis.**—The Hunt Auto Sales Co. has been organized here to operate a garage and agency. The company has the agency for considerable northern Wisconsin territory for the Ford, Little, Chevrolet, Herreshoff, Cutting and National.

**Harrisburg, Pa.**—Ground has been broken for the erection of a large motor car establishment on South Cameron street, Harrisburg, by the C. C. Crispin Motor Car Co. It will be of reinforced concrete, fireproof construction, and will cost \$20,000.

**Anderson, Ind.**—The Remy Electric Co. has discontinued its Indianapolis branch. Owing to the proximity of Anderson to Indianapolis it has been found more expedient to care for Remy users directly from the service department of the company located at the home office. E. L.

Jones, manager of the Indianapolis branch, continues with the company with headquarters at the home office.

**Baltimore, Md.**—The Baltimore branch of the Franklin Automobile Co. has been taken over by W. F. Kneip, who will conduct it on a dealership basis.

**Gary, Ind.**—The Dorman & Sykes Sales Co., recently organized in Gary, has opened up a salesroom at 528-530 Wash street, and has taken the agency for the Ford, Imperial and Oakland.

**Detroit, Mich.**—To succeed C. L. Marble, who recently resigned, Frank J. Sheen, manager of the car order department of the Abbot Motor Co. since its formation, has been made purchasing agent.

**Salem, Wash.**—E. H. Whiteside, R. C. H. agent in Salem, has enlarged his business by forming a partnership with James Sykes. They will handle the R. C. H. and Oakland under the name of the Valley Motor Co.

**San Francisco, Cal.**—John H. Eagal has resigned his position as district manager of the Oldsmobile and has accepted a position with the Consolidated Motor Car Co. of San Francisco, northern California distributor of the Pope-Hartford line. Eagle will have charge of the commercial department.

**Syracuse, N. Y.**—W. C. Blake has been made manager of the Syracuse Goodyear Tire and Rubber Co. branch in place of H. H. Mundy, who has been made district manager in the Syracuse-Buffalo-Rochester territory, with headquarters in Buffalo. J. W. Hobbs, formerly district manager, now has charge of New York state, with headquarters in New York.

**St. Louis, Mo.**—The Ford Motor Co. is to do bigger things in this city than was at first planned. The original plan was to build an assembling plant. At this plant knocked-down cars were to be assembled and then shipped farther south and west. A parcel of ground was purchased at Forest Park boulevard and Sarah street. The announcement now is that the company has purchased an additional 150 feet

connecting with the original purchase. Plans are being drawn for an assembling plant.

**Washington, D. C.**—The Potomac Motor Car Co., agent for the Marmon and Woods electric, has taken possession of its new salesroom at 1226 Connecticut avenue.

**Minneapolis, Minn.**—J. Will Reynolds, member of the Chase truck organization, has been appointed district manager with headquarters in the Chase Motor Truck Sales Co. office, Minneapolis.

**Louisville, Ky.**—The Leyman Motor Co. is now in the garage and salesroom at Brook street and Broadway, formerly occupied by the Urwick Motor Car Co. The Leyman concern handles the Buick line.

**Boston, Mass.**—The Norwalk Motor Car Co. of New England was formed in Boston last week with Charles C. Smith as president and James W. Briggs as treasurer, both of whom are identified with an investment company in Boston. M. A. Beaudet is secretary. The capitalization is \$75,000.

**Boston, Mass.**—Joseph Donovan, who recently took over the Studebaker retail branch in Boston as an agency, has just formed a company to handle it capitalized at \$50,000, of which he is president and treasurer, with A. D. Adams and G. E. Donovan as directors with him, the latter being a brother.

**Toledo, O.**—R. S. Woodhull, formerly sales manager for the Columbus Buggy Co., has been appointed sales manager for the Ohio Electric Car Co., builder of the Ohio electric at Toledo. Mr. Woodhull succeeds Harry Doering, who recently became sales manager for the Gramm Motor Truck Co., at Lima, O.

**Toledo, O.**—The Bunnell Auto Sales Co. has moved from Erie street into new quarters at 1416 Madison avenue. The Abbott Motor Sales Co. also has moved into new quarters in the same building, 1420-22 Madison avenue. The Landman-Griffith is another Toledo concern which moved last week into new quarters at the corner of Fourteenth street and Madison avenue.

## Recent Agencies Appointed by Motor Car Manufacturers

Town	Agent	Car
Toronto, Can.	Republic Motor Car Co.	Oakland
Saco, Me.	Richard D. Milliken	Oakland
Petoskey, Mich.	John F. Quinlan	Oakland
Lapeer, Mich.	England & Howes	Oakland
Scottdale, Pa.	Central Auto Co.	Oakland
Seymour, Ind.	Oakland Sales Co.	Oakland
Richmond Hill, L. I.	Charles N. Collin	Oakland
New York	M. J. Smith	Oakland
Aledo, Ill.	E. B. Miller	Moon
Carcall, Ia.	Swaney Auto Co.	Moon
Hannibal, Mo.	Long Mfg. Co.	Moon
Memphis, Tenn.	Chickasaw Motor Car Co.	Moon
Orange City, Ia.	Aerrote Van Der Wilt	Moon
Petersburg, Va.	W. P. Atkinson Co.	Moon
Taylor, Tex.	Prewitt Auto Co.	Moon
Wakefield, Neb.	Utecht & Elmer	Moon
Wilkes-Barre, Pa.	Regal Sales Co.	Moon
Hartford, Conn.	Howard D. Graves	Moon
Butte, Mont.	Motor Car Distributing Co.	Moon
Davenport, Ia.	Hawkeye Motor Co.	Moon
Columbus, O.	S. W. Schott & Co.	Empire
Lima, O.	Thomas Motor Co.	Cole
Tiffin, O.	H. P. Klaiss & Co.	Studebaker

Town	Agent	Car
Queenstown, Ont., Can.	H. St. Clair Fisher	Franklin
Boston, Mass.	Whitten-Gilmore Co.	Woods
Boston, Mass.	Clifton Edwards	Bergdoll
Milwaukee, Wis.	Esbenshade & Teague	Waverly
Milwaukee, Wis.	Cartercar Wisconsin Co.	Cartercar
Beaver Dam, Wis.	E. H. Peshak	Enger
Milwaukee, Wis.	First Avenue Garage	Davis Flyer
Milwaukee, Wis.	First Avenue Garage	Metz
Milwaukee, Wis.	George Greedo & Brother Co.	Pathfinder
Waukesha, Wis.	Frank Thompson	Apperson
Baltimore, Md.	French, Schutz & Co.	Pratt
Syracuse, N. Y.	J. T. Holland	Palmer-Singer
Phoenix, Ariz.	Arthur Ainsworth	Paige-Detroit
Kingman, Ariz.	D. E. Nelson	Auburn
Prescott, Ariz.	Massing Brothers	Buick
Toronto, Can.	Death & Watson	Rauch & Lang
Calgary, Can.	Central Garage & Machine Shop	Cole
Edmonton, Can.	International Motor Co.	Cole
Prince Albert, Can.	L. Broadfoot & A. J. Manville	Cole
Regina, Sask., Can.	H. A. Gordon	Cole
Montreal, Can.	V. O. Reed	Atlas
Montreal, Can.	V. O. Reed	Hupmobile
Montreal, Can.	V. O. Reed	Speedwell





# Among the Makers and Dealers



**NEW Atwater Kent Sales Manager**—W. W. Nevins has recently been appointed sales manager for Atwater Kent.

**Syracuse Changes Dates**—The dates of the Syracuse, N. Y., show have been changed to February 25 to March 1, instead of the later date as first selected.

**Sioux City Show Doubtful**—After having produced in succession three highly successful annual exhibitions, the dealers of Sioux City, Ia., are threatening to abandon the show idea for this year, even though dates have been assigned. The reason lies in the fact that no suitable hall is to be had.

**Portland Dealers Incorporate**—The Portland Automobile Dealers' Association of Maine has been made a corporation and it has a capitalization of \$10,000 with shares at par value of \$25. The officers elected comprise Fred A. Nickerson, president; Ernest F. Brewer, treasurer; Luther C. Gilson, secretary.

**Klaxon as Factory Signal**—The Critchley Machine Co., Worcester, Mass., has installed in its factory a Klaxon warning signal which serves as the factory whistle. Similar uses of the Klaxon have been found as adjunct to the fire alarm systems of a number of other manufacturing institutions. The Clark Thread Co., of Newark, N. J., has recently installed seventy-six Klaxons for this purpose, and the New York Belting and Packing Co., of Passaic, N. J., is using twelve in a similar way.

**New Wheel Company**—With \$130,000 capital stock the Seaton Wheel Co. has been incorporated at Nashville, Tenn. The company owns patents in the United States, Canada, Mexico and England on a motor wheel designed to do away with the use of pneumatic tires. John T. Landis is president of the company; S. S. Lord, vice-president; Granberry Jackson, treasurer; J. R. Boone, secretary. A plant is being equipped in Nashville for the manufacture of the wheels and arrangements are being made for the formation of a subsidiary company in Detroit.

**Want Cheaper Aluminum**—Agitation starting in New York to endeavor to reduce the duty on aluminum has reached Detroit, and, while no organized effort to bring about the reduction is under way in this city, officials of the larger concerns declare it would be a good thing for the trade. It is declared at the present time aluminum is being sold cheaper in Europe and Canada than in the United States. According to F. H. Diehle, purchasing agent of the Ford Motor Co., the abolishing of the duty would be a saving to them of 7 cents a pound on 3,000,000 pounds which they will use during the coming season. C. H. Booth, assistant general

manager of the Studebaker Corporation, declares it would mean a great saving to car makers if the tariff were reduced.

**Guatemala Ruling**—By a recent presidential decree all invoices for goods to enter Guatemala must be accompanied by the bill of lading. Failure to comply with this regulation served to delay two recent shipments of motor cars.

**Name Changed**—Because of conflict in names with that of the Michigan Motor Car Co., the Michigan Automobile Co., of Kalamazoo, Mich., has become the Fuller & Son Co., with a capital of \$100,000. The officers decided to reorganize and enlarge and change the name of the company. The concern will produce parts.

**Stromberg Changes**—Harry C. Tillotson, formerly a director and treasurer of the McDuffee Automobile Co. of Chicago, is now a director and secretary of the Stromberg Motor Devices Co. and in addition to the active duties of secretary he will have personal supervision of the sales. William L. O'Neill, formerly manager of the New York office, has been appointed manager of the Detroit office, and will handle the business in Michigan, Ohio and Canada. R. B. Whitman, formerly with the Bosch company, has been appointed manager of the New York branch, to succeed Mr. O'Neill.

**Government Accepts Bids**—After having the bids under consideration for nearly 2 months the general supply committee has awarded the following contracts for furnishing motor trucks to the government during the balance of the fiscal year: The White Co., Cleveland, O., 1,500-pound and 2,000-pound trucks, \$1,950; 3,000-pound trucks, \$2,750; Hupp Motor Car Co., Detroit, 1,000-pound trucks, \$950. It is expected nearly a dozen trucks will be purchased under this contract and at its expiration it is likely new bids will be invited. The trucks will be used in Washington.

**Chance in Guatemala**—President Estrada Cabera of Guatemala is taking much personal pride in the development of his plan to increase good roads in the southern republic. His idea is to get the land owners and wealthy members of the community to buy cars. Once that this is accomplished he feels certain that good roads will follow quickly. One of the first steps planned is the holding of a show. Owing to the expense of transporting cars from the United States and Europe there are many difficulties to be overcome in holding a show of this kind in Guatemala City, but it is thought it will be done even if a government subsidy has to be offered in order to induce manufacturers to send a show car. Efforts now are being made to

get local agents to order cars on the chance that there will be a ready market for them after the show.

**C. A. Swinehart Resigns**—Announcement is made by C. A. Swinehart that he has resigned as sales manager of the Swinehart Tire and Rubber Co., to take effect February 1. He will continue in the tire business, but has not made any definite plans.

**New Truck Association**—The San Francisco Motor Truck Association is the name of an organization of motor truck men of that city. Officers were elected as follows: President, Charles B. Lewis; vice-president, C. E. Osborn; secretary-treasurer, Harold D. Knudsen.

**New Pope Corporation**—The changing of the Pope Mfg. Co. of Hartford, Conn., from a Connecticut to a Massachusetts corporation resulted in a new corporation being formed at Boston capitalized at \$6,500,000, comprising 65,000 shares at \$100 each. Albert L. Pope is president; George Pope, treasurer, and Robert L. Clapp, clerk.

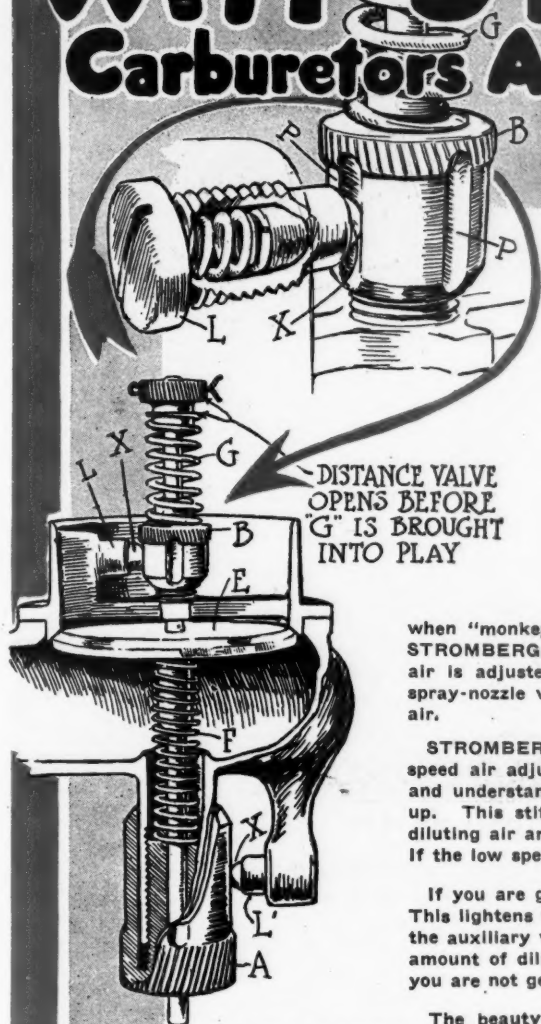
**Receiver for Dash Company**—Edward W. Pierson has been appointed receiver for the Indianapolis Dash Co. of Indianapolis, and has given bond in the sum of \$25,000. The receiver was appointed on application made to the superior court by the John Reilly Co. and the E. H. McCormack & Sons Co., creditors in excess of \$4,000. Several creditors have brought proceedings in the federal court to have the company adjudged bankrupt. Included in the liabilities are notes for \$21,000 due Indianapolis banks.

**Gasoline Prices High**—The municipal authorities and other large users of gasoline in Indianapolis are finding it difficult to place satisfactory contracts for gasoline for this year. The best figure that is being quoted is 1/2 cent off of the market price. In the past it has been possible to make contracts at from 9 1/2 cents to 10 1/2 cents a gallon, with the benefit of any reduction below the contract price. Most of the large users are now paying from 14 to 15 cents a gallon for gasoline, while some of the smaller users are paying from 18 to 20 cents a gallon.

**Tri-City Dealers' Election**—At the annual meeting of the Tri-city Automobile Dealers' Association at Davenport, Ia., officers were elected as follows: President, J. W. Buck; vice-president, P. C. Petersen; secretary-treasurer, W. L. Mason; board of directors, J. W. Buck, P. C. Petersen and W. L. Mason, Davenport; A. J. Ostlund, Moline, and M. E. Strieter, Rock Island. G. F. Burmeister, Davenport, retiring president, was chosen general manager of the annual show, which will be held at the Coliseum in Davenport February 19, 20, 21 and 22.

# WHY STROMBERG

## Carburetors Are Easiest to Adjust—and Stay Adjusted.



"Don't monkey with the carburetor!" is the warning that goes with every carburetor which, to be adjusted, requires the attention of a mechanical expert, working at so much per hour. There is no "hands off" restriction placed on STROMBERG Improved Carburetors. Any novice can adjust them quickly, with his own hands, on his own time.

Here are "Reasons Why." Ordinary carburetors have two separate adjustments, one for air and one for gas, the latter being too sensitive to be tinkered with by any but an expert.

There is only one simple adjustment on STROMBERG Improved Carburetors—that governing the air. There is no delicate gas adjustment to knock the carburetor out of kilter when "monkeyed with" by inexperienced hands. The novice can't spoil the STROMBERG gas adjustment, because there isn't any. When STROMBERG air is adjusted, the gas automatically regulates itself. The suction at the spray-nozzle varies in "just-right" proportion to the changes made with the air.

STROMBERG low speed air adjustment is governed by nut "A," the high speed air adjustment by nut "B." Both adjustments are thoroughly simple and understandable. If your low speed mixture is too "lean," turn nut "A" up. This stiffens the tension of the low speed spring "F," cuts down the diluting air and creates a stronger suction on the gas—enriching the mixture. If the low speed mixture is too "rich," simply turn nut "A" down.

If you are getting too much gas on high speed, simply turn nut "B" down. This lightens the tension on the high speed spring "G," which in turn permits the auxiliary valve "E" to open at lighter motor suction and admit the needed amount of diluting air consistent with a "just-right" high speed mixture. If you are not getting enough gas, turn nut up.

The beauty of having two distinct speed springs—a low "F" and a high "G"—is here forcibly brought home. You are able to adjust your carburetor to a perfect low speed mixture without interfering in any manner with your high speed mixture. And at the same time you are able to adjust your carburetor to a perfect high speed mixture absolutely without interfering with your distinctly separate low speed adjustment. Such an arrangement is impossible to ordinary carburetors, combining both low and high adjustments in one spring.

The above are "Reasons Why" STROMBERG Improved Carburetors are easiest to adjust. The reason they stay adjusted is because of the spring locks (L) and (L'). The head (X) of the lock fits firmly into grooves (P); no car vibration can displace it. The hand of the motorist is the only thing that will change a STROMBERG adjustment.

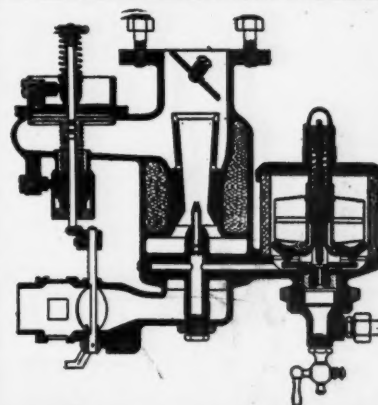
Next week will appear, "Why STROMBERG Improved Carburetors Are Most Economical Under All Weather Conditions." Your address on the back of a post card will bring you all "Reason Why" Talks issued to date.

### "Reason Why" Talk—5

Look for Our Exhibit at the Chicago Show. Space 81, Coliseum Balcony

**Stromberg Motor Devices Co.**  
100 East 25th St., Chicago, Ill.

BRANCHES:  
New York    Boston    Detroit    Indianapolis  
Minneapolis    San Francisco

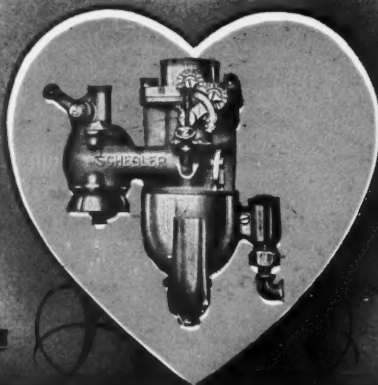


Sectional View—Model A



# SCHEBLER

*The Aristocrat  
of Carburetors*



*"The Heart of the Automobile"*

## WHEELER & SCHEBLER

"Pioneers in Perfection" of Carburetion

MANUFACTURERS  
INDIANAPOLIS U.S.A.

### THE SCHEBLER IS THE ACKNOWLEDGED STANDARD CARBURETOR OF THE WORLD

#### *Branches*

NEW YORK  
BOSTON  
PHILADELPHIA  
ATLANTA  
MINNEAPOLIS  
KANSAS CITY  
CHICAGO

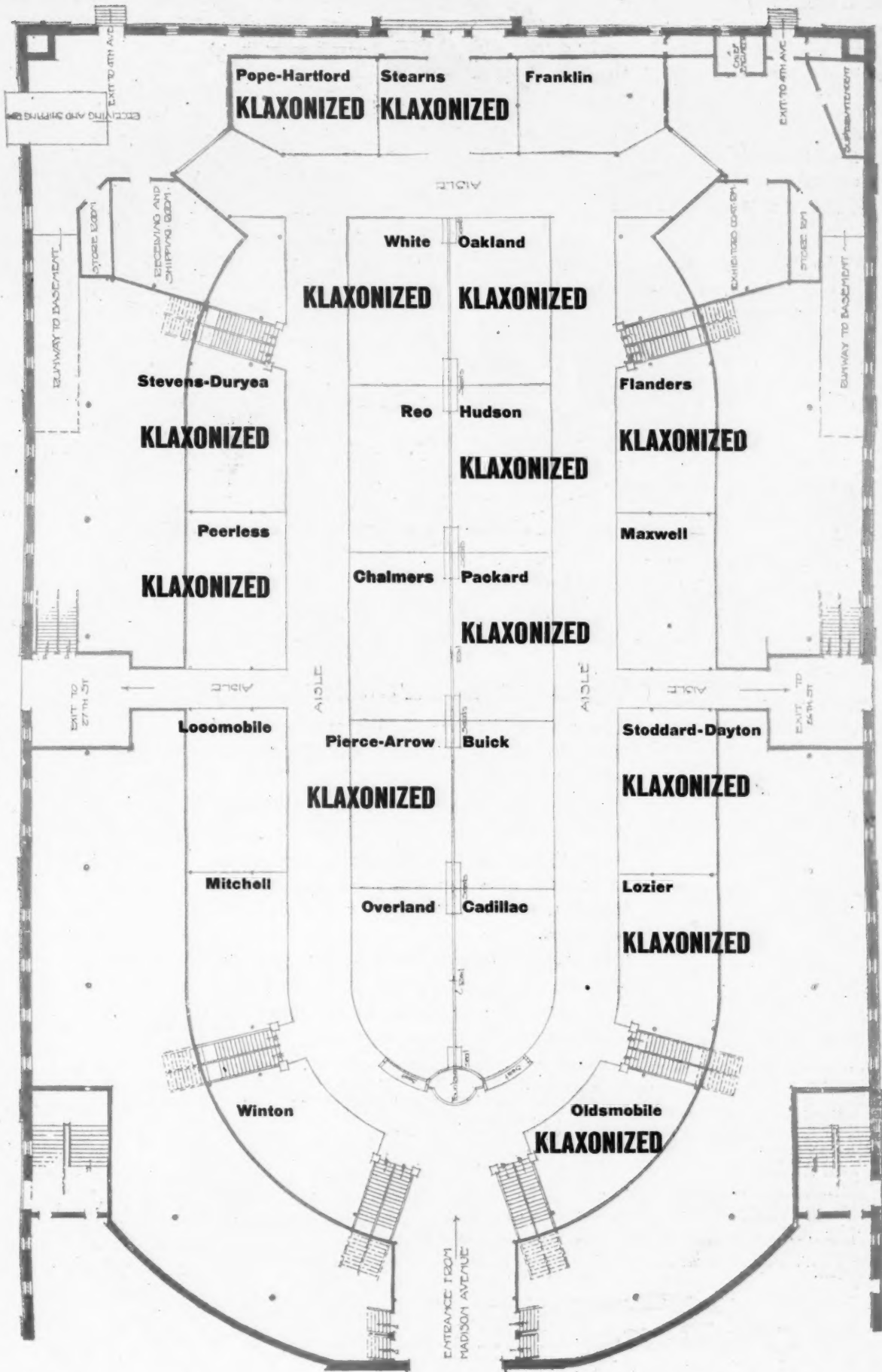
DETROIT  
DENVER  
SAN FRANCISCO  
LOS ANGELES  
SEATTLE  
MONTREAL CAN.  
SIDNEY AUSTRALIA

#### *Service Department*

#### Distributors

Every city and town in  
the United States and  
Canada • Europe and  
• Australia •

# MAIN FLOOR—MADISON SQUARE GARDEN AUTOMOBILE SHOW



MADISON AVENUE  
When Writing to Advertisers, Please Mention Motor Age.



Stock Champion

National

International Champion

Noiseless  
Easy riding  
Ample, flexible power  
Center control and left-side drive  
The \$5000 car's only rival



Improved Series V includes Five Models  
Semi-Racing Roadster, Speedway Roadster, Toy Tonneau,  
Five and Seven Passenger Touring Cars  
\$2750 to \$3400

## Combines Luxury and Utility

The National car is the epitome of years' work to combine luxury and every day reliable service.

Twelve years of concentration guarantees your National car.

Beneath the surface beauty is perfection in design and materials—dependability, stamina, and flexible power that is indefatigable.

The stately elegance of the National—its richness in appointments, comfort and ease make it acceptable to the most discriminating.

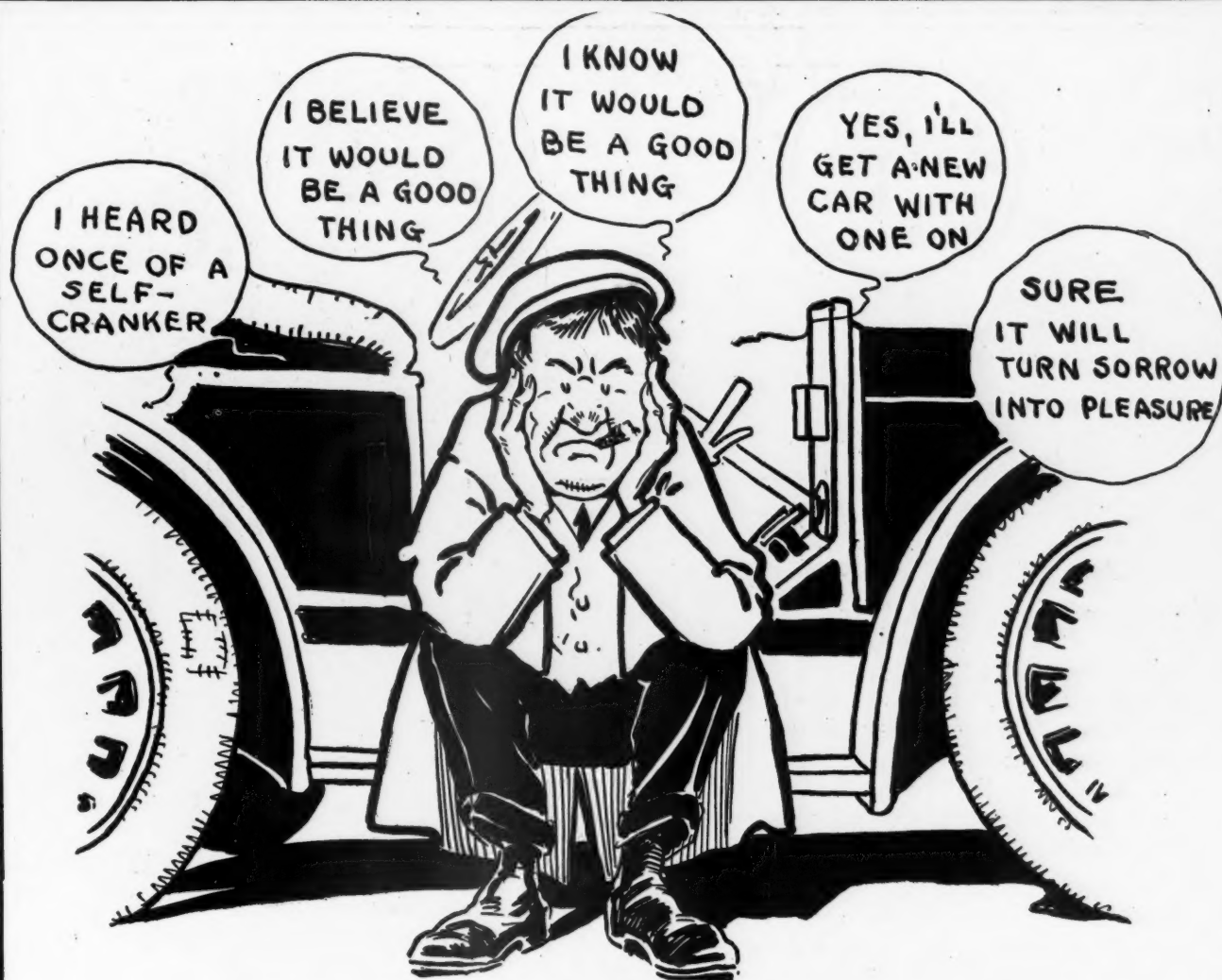
Long stroke (4 1/2 x 6) flexible and noiseless Motor with enclosed valves.  
Left Side Drive.  
Center Control.  
Gray & Davis Electric Starter, easily operated by simply touching a button with foot.  
Gray & Davis Dynamo Electric Lighting System.  
Bosch dual double Magneto.  
12-inch Turkish Upholstery.  
Full heavy nickel Trimmings.  
Electric Horn.  
Adequate Baggage-carrying Compartment concealed in body but easily accessible.  
Powerful and reliable Brakes.  
Spacious Interior.  
Tire Pump, integral part of the motor. Inflates a tire in three minutes.  
12-inch Gray & Davis black and nickel electric bullet headlights.

Truffault-Hartford Shock Absorbers on rear.  
One extra Firestone demountable rim.  
128-inch Wheel Base.  
Adjustable, ventilating and rain vision Wind Shield.  
Multiple jet Carburetor.  
Hoffecker steady-hand Speedometer.  
Tire Carrier in rear.  
Silk mohair Top, Top Cover and Curtains.  
Full-floating Rear Axle.  
Resilient Springs, 3-4 Elliptic in rear; Semi-Elliptic in front.  
Large gasoline pressure-feed Tank with Gauge in rear.  
Robe rail and Foot Rest; Foot Mat in Running Board.  
Plain, continuous enclosed Metal Guards.  
Easy riding qualities, unexcelled.  
Oiling system, demonstrated to be only perfect oiling system.

**National** MOTOR  
VEHICLE CO.  
Indianapolis Indiana

When Writing to Advertisers, Please Mention Motor Age.

**COUPON**  
NATIONAL MOTOR VEHICLE COMPANY  
INDIANAPOLIS, INDIANA  
Please send by return mail your full information on Improved Series V Cars.  
Name .....  
Address .....



## ALL IN, DOWN AND OUT

How often, after cranking your head off, without getting your car started, have you felt like this gentleman? Oh yes, he was a gentleman a short time ago, but he doesn't look like one now, we'll admit.

### See That Your 1913 Car Has an Electric Cranker

and you can always look like a gentleman whether you are or not. But be sure, for efficient, long-lived service, that your electric equipment is operated from an



### STORAGE BATTERY

Use Class A **GLBA** Battery with an Electric Lighting Generator

Use Class B **GLBA** Battery with an Electric Self-Starter

*Write us for full information*

## Willard Storage Battery Co. CLEVELAND, OHIO

New York Branch: 136 W. 52d St.  
Detroit Branch: 1191 Woodward Ave.

Chicago Branch: 2241 Michigan Ave.  
San Francisco Branch: 243 Monadnock Bldg.

*Depots in all Principal Cities in the United States, Canada and Mexico*

*When Writing to Advertisers, Please Mention Motor Age.*



## Now You Can Afford to Electric Light Your Car

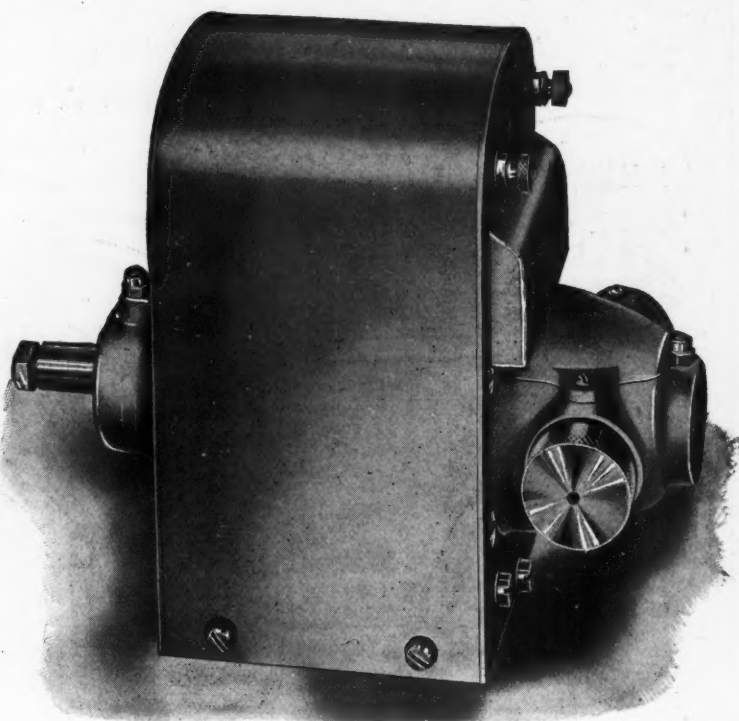
Every manufacturer and motorist knows that **electric lights** are the thing for 1913. Almost every 1913 car offers them as regular equipment.

Why should **your** car be without up-to-date lighting equipment, when you can get a **WELLS ELECTRIC LIGHTING SYSTEM** at **reasonable cost**—with the knowledge that, once installed, electric lighting is insured to you for the life of your car?

### The Wells Generator is Simple, Compact, Trouble-Proof

No other device on the market can equal it in simplicity. It has 2 moving parts only. That means wear reduced to a minimum. It comprises no special windings nor complicated regulating devices such as friction-drives, rheostats with moving parts, etc., etc. That makes for troubleproofness.

The device is so exceedingly compact that it takes up little room, and, unlike other devices, adds very little weight to your car.



### The Current Output is Automatically Controlled

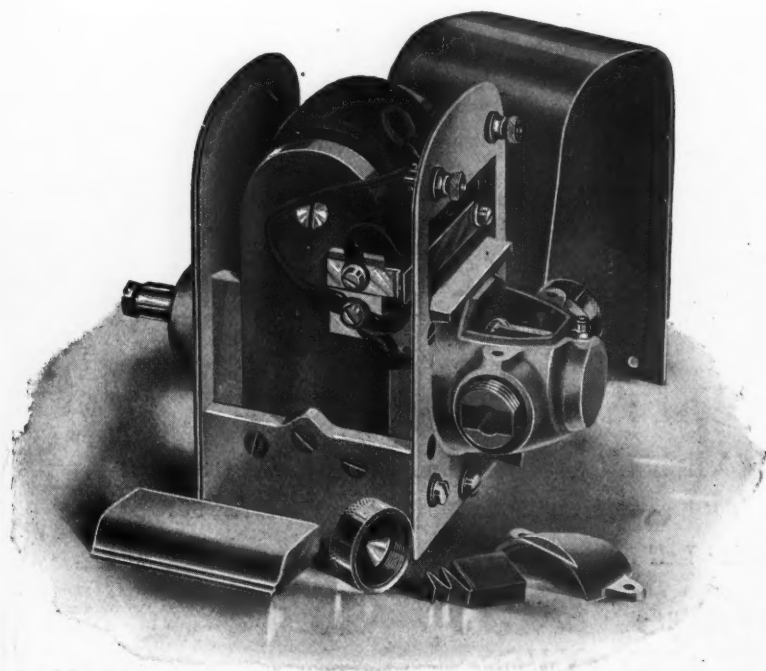
A constant battery charging rate is maintained, regardless of the speed of the motor—your light never alters at high or low speed. A magnet shunt prevents any damage being done to the battery when the lights are off.

The generator is fully enclosed; there are no openings whatever to draw in grit or dust. The scheme of wiring is simple, convenient, and economical to install.

The material used throughout is the best obtainable. The armature built at our factory is of highest grade sheet steel, insulated and wound with best double cotton-covered magnet wire. The commutator, made to order for us, is of hard-drawn copper bar segments, thoroughly insulated with best mica. High grade silver graphite brushes are of ample size to carry all current produced.

Let us send our representative to your factory, or write for prices and details in full.

**R. C. WELLS MFG. CO.**  
Wells Bldg., Fond du Lac, Wis.



# HOLLEY

## CARBURETOR



### Power Acceleration and Hill-Climbing Ability

are directly proportional to and determined by the efficiency of the carburetor used.

Your selection of a carburetor is therefore of the utmost importance.

You may be getting only 50 per cent. value out of your car.

Why don't you find out by putting on a Holley?

The Holley is the most **modern** carburetor made, **FREE** from the faults and variable conditions which beset those using springs, balls, cams, etc.

The Holley has no moving parts—and only **one** adjustment.

Selling by the thousands.

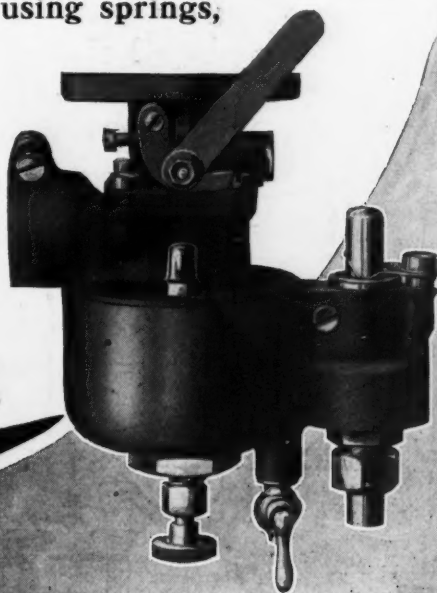
140,000 sold in sixteen months.

100,000 on order.

*Well worth your investigation.  
Full information on request.*

**Holley Brothers Co**  
Detroit, Mich.

**NO  
MOVING  
PARTS**





# Here is a Winner

No tube  
ever sold on the  
American market has  
ever approached this one,  
either in appearance or durability.

## United States

As every dealer well knows, there is an established demand in every part of the country for a really first class, extra tough, extra long-lived red tube. Motorists everywhere—particularly the owners of high-grade cars, are willing to pay an extra price for a special red tube if they can be assured of getting extra tube value for their money. And that is precisely what they get in a UNITED STATES RED SPECIAL TUBE.

The Red Special is decidedly the highest grade tube that has ever been sold on the American market. It is a tube that is not



They come packed  
in a red carton  
like this

## United States

When Writing to Advertisers, Please Mention Motor Age.



# New Red Tube

Winning  
the trade of the  
man who owns the high-  
grade car will be easy for the  
dealer who handles this tube.

## Red Special

only attractive in appearance but is also doubly attractive from the standpoint of economy on account of its extra toughness and wearing quality. Another very important point of superiority is the fact that after being inflated it will return absolutely to its original size. A tube that stretches is difficult to replace in a casing and is extremely liable to be pinched. Each Red Special Tube is enclosed in a red flannel bag and boxed in an attractive red carton. Everything about the tube will appeal to the man who wants a high-grade tube for high-grade service.

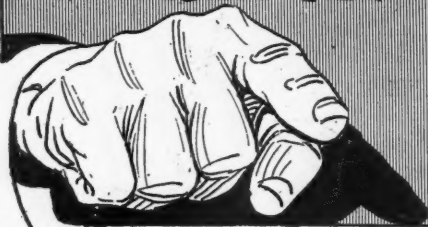
Cross-section  
view

# Tire Company

When Writing to Advertisers, Please Mention Motor Age.



ARE YOU AN  
AIREASER YET



# Airease

## Delay is the Greatest of All Thieves

Every day the motorist delays using AIREASE puts him farther from the realization of real motoring comfort and the proper economy of automobile upkeep.

In the past it was excusable to undergo the expense and annoyance of blowouts and punctures, but this was before the day of AIREASE. It was the time when motorists could choose between expensive but easy-riding pneumatic tires and hopelessly inadequate and destructive tire fillers.

We cannot put too much emphasis on the fact that AIREASE is as different from these so-called tire fillers in which motorists have invested to their sorrow as success is from failure.

Previous manufacturers of tire fillers offered the motorist an enticing, well-worded guarantee against punctures and blowouts, but against punctures and blowouts only. They did not tell the unsuspecting public that their fillers were made of rubbish that would rot the rubber in their tires.

The AIREASERS flatter themselves that they are not as other folks

This is just where the superiority of AIREASE over other tire fillers lies. AIREASE contains no compounds that will injure rubber. It has the durability of steel, and even greater elasticity and resiliency than compressed air. But AIREASE goes even further than this: It *never loses this resiliency*, no matter how long it is in use. Tubes filled with AIREASE never develop "that nice flat spot" to show where the car has been standing. It positively cannot injure the tire.

All these are great claims, and we could not make them if we did not positively know that AIREASE is a perfect chemical combination and a positive commercial success.

We do not simply claim that AIREASE is *proof against punctures and blowouts*. We guarantee that it is the only safe and satisfactory substitute for pneumatic tires ever invented.

This is the most liberal proposition ever made by any manufacturer of automobile parts or accessories, and we offer it because we know that we can live up to it.



### Our Offer

To any man who wants to try AIREASE we guarantee that if he is at all dissatisfied after trying it we will return every penny he pays and supply him with a new set of inner tubes FREE—that is, if he wants to go back to the expensive, troublesome pneumatic tire. That's some offer.

SEE HOW TO MAKE YOUR

## Be a Public Benefactor Sell Airease

If automobiles were not so expensive to keep up they would be more universally used.

The greatest obstacle in the way of more general ownership of automobiles is tire expense, and here, Dealers, is just the reason why AIREASE means a boon to motorists, greater impetus to the automobile industry and increased profits to a great number of dealers.

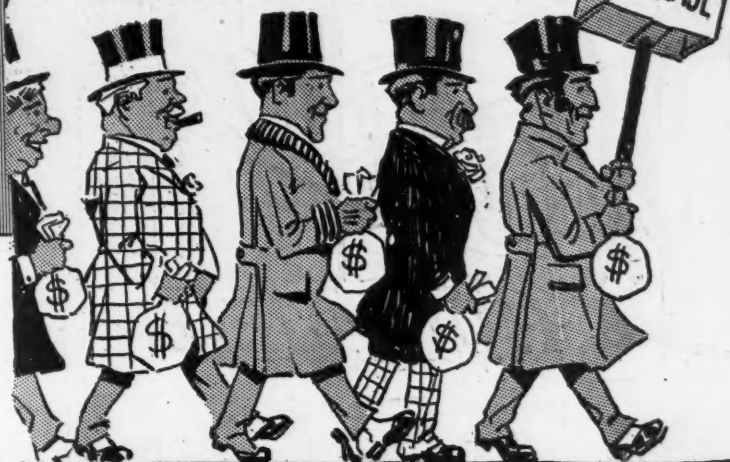
Dealers, you have seen tire fillers before, and you have been disgusted with them, believing that they never could substitute pneumatic tires. But this is simply because you have not investigated AIREASE.

AIREASE never loses its resiliency, and the longer you use it the better it gets. Furthermore, it is not a combination of glue, water, glycerine, chalk, acid, etc., put together simply to sell, regardless of what they may do to your tires or how long they will last.

AIREASE is the invention of one of the greatest living chemists, and it has been thoroughly and severely tested for three years before it was marketed. It is backed by a million-dollar corporation composed of hard-headed successful business men, who realized from their own motoring experience that AIREASE is *just what motorists need*.

Here, then, is a combination that no dealer can afford to overlook. AIREASE is a guaranteed commercial success and a positively perfect substitute for pneumatic tires. We knew this before we filled the first inner tube with it, and now that we have used it in hundreds of tires over thousands of miles, and also filled 2000 tires, we are proclaiming in widespread publicity the gospel of AIREASE. Motorists throughout the country are reading our advertisements and pouring in their inquiries.

### THE MEN WHO SELL AIREASE



Success is envied by  
the best of men.

*We want a few more dealers.* We have a wonderful product and we offer the most liberal and honest guarantee that could possibly be made in support of any article. We will give every motorist who tries AIREASE and is not satisfied a complete new set of inner tubes, as well as every dollar back.

Now, Dealers, with an article like AIREASE and a guarantee like this, you can't fail to make tremendous profits during the coming year if you succeed in getting the AIREASE agency in any section. You can't afford to hesitate if in doubt. Write today for our special agency proposition and space yet available.

## Airease Tire Filler Company

Corner 14th Street and  
Pennsylvania Ave.

WASHINGTON,  
D. C.

M. A.  
1-23-13

MARK WITH X PROPOSITION YOU ARE INTERESTED IN

AIREASE TIRE FILLER COMPANY, Washington, D. C.

Gentlemen:

☐ I am interested in tire filling and desire to know the cost of filling my tires. Front size, ..... rear size, .....

☐ I am interested in Airease. Please furnish me cost of filling plant for this territory.

Name.....

Street.....

City.....

OWN TIRE-FILLER IN NEXT WEEKS ADVT.

798

When Writing to Advertisers, Please Mention Motor Age.



# Warner

## AUTO-METER



For sale by leading dealers all over the world and at our branches listed below. The prices are never changed—never cut. They never vary. You pay the same price in one state as you would in another. Priced from \$50 to \$145, according to size and style.

The Warner instrument is *made like a fine watch*. It is a thoroughly jeweled instrument. The jewels used are *select first quality Sapphires*, accurate to 1-2000th of an inch and polished like a diamond. These sapphires insure absolute precision—for life.

*Handsome Catalog on Request*

### Stewart-Warner Speedometer Corporation

Factories: Chicago and Beloit

General Offices: 1931 Diversey Blvd., Chicago

New York Los Angeles Chicago Minneapolis Kansas City San Francisco  
Detroit Philadelphia Indianapolis Cleveland Boston St. Louis Atlanta Buffalo  
Cincinnati Denver Pittsburgh Portland Seattle Toronto London Paris

## The WARNER AUTO-METER

(Magnetic Type)

Is the **"Dominant Speedometer"** with both the makers and the owners of high priced American motor cars. Nearly all of the makers of high priced automobiles are now installing the Warner as "regular equipment" on their cars. In their catalogs and in their newspaper, periodical and magazine advertising you will find the name "Warner" displayed prominently in bold type. They want that name to catch the eye of the prospective car buyer. Makers of the highest priced cars specify the Warner in their advertising and install it on their product because they know that the class which purchases their cars—keen, well-posted, fastidious buyers—insist on the highest quality of equipment and will have none other than the Warner Auto-Meter. Owners of high priced cars are proud of the Warner Auto-Meter equipment because it has a reputation for highest excellence and in keeping with their standard of exacting requirement.

### SPECIAL

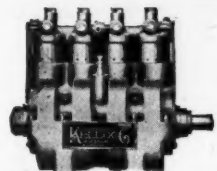
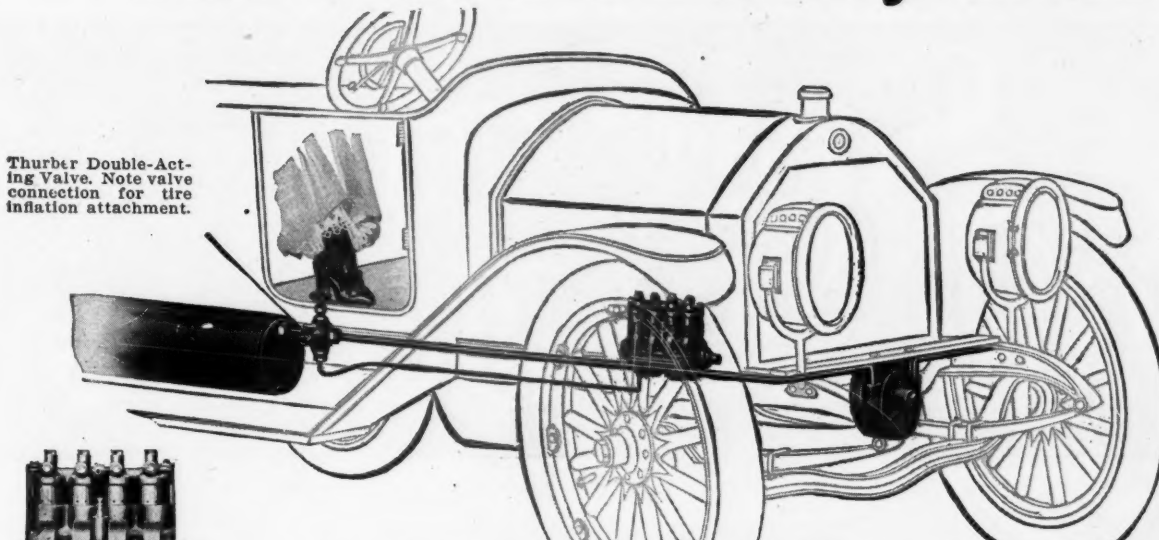
We have arranged to place the splendid facilities of our Beloit factory at the disposal of automobile engineers for the purpose of designing new models of speedometers, with special installations and driving equipment adapted to meet the individual requirements of each special make of motor car.



Model K2  
Price \$75

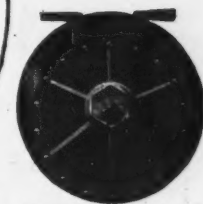
# The Thurber Rotary Starter

Thurber Double-Acting Valve. Note valve connection for tire inflation attachment.



Kellogg Air Pump used in Thurber system

Thurber Rotary Starter System attached to car, showing tank under car, pump under bonnet, and rotary starter in front. The latter is the only part exposed to view. Note few parts and simple, clean arrangement. Also note the small size of the starter compared to the lamps.



Front view of starter

## Let The Ladies Drive—We'll Do The Cranking

**T**HE Thurber Rotary Starter is different in principle from any starter on the market. It is operated by compressed air, but in a different way from other air starters.

During the development of our patented starter, we have spared no expense and have developed it to its smallest detail. We have been in constant touch during the past two years of its development with the leading engineers of this country and now that the finished product is ready, they unanimously agree that of all the starters developed, ours is the *simplest, most efficient, most powerful and most thoroughly practical.*

### Simple in Operation

The Thurber Rotary Starter is operated by compressed air furnished by the famous Kellogg Water Cooled High Pressure Pump, which makes possible the carrying at all times of 200 pounds of air pressure. The air is stored in a welded steel tank carried out of sight under the body of the car. To start the motor, the driver simply pushes down on the patented Double Acting Valve, as shown in the illustration above, and the air is delivered to the Rotary Starter which instantly spins the motor. As soon as the engine starts an automatic clutch disengages the starter and it remains idle until again used.

### A Cold Weather Starter

The Thurber is the only starter that will actually spin the most powerful motor over 200 revolutions per minute—the natural way to start. In cold weather this is especially important, as the slow turning over of the ordinary starter is rarely sufficient to start the motor. The Thurber Rotary Starter, on account of the speed at which it cranks the motor, makes it possible to start as easily in cold as in warm weather and so gives perfect satisfaction the year round.

*This rapid spinning also makes it as easy to start on the magneto as on the battery.*

A valuable feature of the Thurber Rotary Starter is the *tire inflation attachment* which takes away the labor of pumping up flat tires. This alone is a very valuable addition to the convenience and comfort of a car.

### Power Enough to Spin Any Motor

The Thurber Starter is an extremely powerful device and spins easily the most powerful or the "stiffest" motor. Perhaps the manufacturer of your big car could not find a starter powerful enough to operate the motor, and for this reason you are daily straining, with risk of broken bones, to start your car.

You need do this no longer, for the Thurber Starter will solve your problem quickly and economically. It has wonderful power with the use of very little air, and operates easily in cranking the most obstinate motor.

Insist on the manufacturer equipping your car with the Thurber System.

### Manufacturers, Attention!

Cars are often condemned by users because of the failure of or annoyance given by some of the equipment. You should exercise the greatest care in selecting a starter which is easily understood—one which the owner can readily maintain without the assistance of a skilled mechanic.

The adoption of the Thurber Rotary Starter will give you a device at once simple and efficient, free from troublesome parts, powerful enough for any motor, economical to operate, and made to actually crank the motor rapidly—the quickest and surest way to start it.

The surest way to the real satisfaction of your customers is by the use of the Thurber. It means not only present popularity for your cars, but greater future success for your business.

### Can be Installed on Any Car

This feature alone, aside from other advantages, makes this the best proposition the manufacturer can adopt, because it enables him adequately to take care of the pressing demand of early customers for a starter. The manufacturer can easily satisfy owners of his earlier models, who wish to make their cars up-to-date in this respect by installing the Thurber Rotary Starter for them.

We shall be glad to submit our proposition and special designs to the engineers of automobile companies and invite correspondence with anyone so interested. See the Thurber Rotary Starter at the Chicago show and write for book giving detail description.

## The Thurber Rotary Starter Company, Detroit, Mich.

Factory—Chene and Atwater Streets

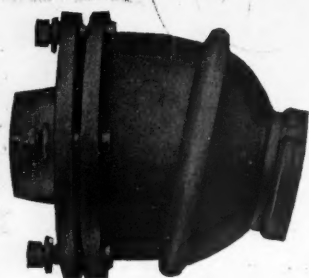
General Offices—730 Woodward Avenue

When Writing to Advertisers, Please Mention Motor Age.

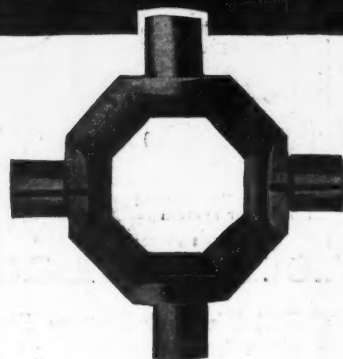


Universal Equipment for High Class Cars

# Spicer Universal Joints



**OIL TIGHT  
DUST PROOF**



"SPICER" Universal Joints are recognized as the Standard for American Cars. There is a reason for SPICER superiority. We have our own Drop Forging Plant and are therefore able to control the quality of steel in our Drop Forgings. The competent workman and strict inspection standards in our machine department insure a finished product whose accuracy and strength have created the slogan. "SPICER" is Quality.

**DOMESTIC REPRESENTATIVES:**

K. Franklin Peterson...122 So. Michigan Blvd., Chicago  
Thos. J. Wetzel.....17 West 42nd St., New York  
L. D. Bolton.....1810 Ford Bldg., Detroit

**FOREIGN REPRESENTATIVE:**

Benjamin Whittaker.....21 State St., New York

**Spicer Mfg. Co.  
Plainfield, N.J., U.S.A.**

# The Atwater Kent Ignition System



has been silently advertised from coast to coast by the best advertisement any product can have—the personal endorsement of over 100,000 satisfied motorists.

During the period of the magneto craze, we could have taken advantage of this fad and manufactured magnetos. Due to our facilities and prestige, we could undoubtedly have produced and sold large quantities of them. We knew, however, that the Atwater Kent System was fundamentally correct in principle and that it was better than any other ignition device. This opinion was also shared by thousands of our friends who discarded the magnetos on their new cars and installed the Atwater Kent, claiming they got much better results with much less trouble.

You can't equip your car with a more reliable ignition system than the Atwater Kent—no matter what amount of money you are willing or expect to pay for it. Why then take chances by investing in other equipment when by installing the Atwater Kent System you close every avenue to future regret?

Just a few of the many good features of the Atwater Kent System and its advantages over the magneto:

The spark is of constant heat quality irrespective of the speed of the engine, thereby enabling the engine to be run at a very much lower speed if desired.

The simplicity and accessibility of the different parts of the Uni-Sparker are much greater than in the case of the magneto.

The adjustment of the platinum contacts does not affect the timing of the spark.

Easy adjustment to lengthen or shorten the spark, thereby insuring the maximum economy of battery current.

Low maintenance cost and repair expense. Will start engine on spark. Duplicate ignition system not necessary. Light weight.

No magnets to become demagnetized. Unlimited range of spark advance or retard. Low initial cost.

In connection with the standard Type F System, we are furnishing a new model—Silent Type K with automatic spark advance and insulated primary circuit, especially designed for use in connection with lighting and starting equipment.

## PRICES OF THE TYPE F SYSTEM

	Standard Coil	Kick Switch Coil
1-cylinder	\$17.00	
2-cylinder opposed	18.00	
2-cylinder distributor type	22.00	\$24.00
3-cylinder distributor type	25.00	27.00
4-cylinder distributor type	25.00	27.00
6-cylinder distributor type	27.00	29.00

## PRICES OF THE TYPE K SYSTEM

	Standard Coil	Kick Switch Coil
2-cylinder	\$32.00	\$35.00
3-cylinder	35.00	38.00
4-cylinder	35.00	38.00
6-cylinder	37.00	40.00

If you have an unsatisfactory magneto, or if your engine has no timer shaft, you can use the Atwater Kent System by means of a special "magneto gear mounting," the cost of which is \$5.00 in addition to the above prices.

*Possibly all that car of yours needs to give perfect service is an Atwater Kent Ignition System.  
Our booklet, "A," is as interesting as it's free—yours for the asking.*

See Our Exhibit  
Space 8, Coliseum, Chicago

# ATWATER KENT MFG. WORKS

## 4934 Stenton Avenue, Philadelphia

*When Writing to Advertisers, Please Mention Motor Age.*





**\$985**

F. O. B. Toledo

*Completely  
Equipped***Overland****\$985**

F. O. B. Toledo

*Completely  
Equipped*

## High-priced feature No. 12

The springs on the Overland Model 69T equal those on \$1200 cars. They are of the highest grade, heat treated spring steel.

The front springs are semi-elliptic, 36 inches long and  $1\frac{3}{4}$  inches wide.

The rear springs are three-quarter elliptic, 42 inches long and  $1\frac{3}{4}$  inches wide—with scroll ends.

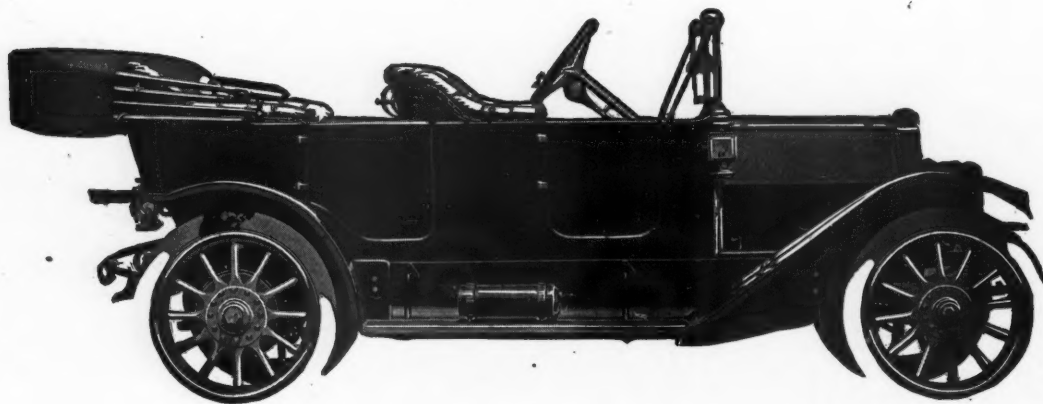
Model 69T springs each possess six sturdy leaves with steel bushing eyes. The shackles are drop-forgings; they are fitted with case-hardened bolts, working in special auto-friction bushings. The spring seats in the rear axle are left free to oscillate on their saddles, insuring great riding comfort.

Model 69T springs must finally endure a vibration test on a special testing machine with a capacity of 6,000 lbs.

We repeat again; \$1200 cars have no better springs than the Overland for \$985.

Write us for literature. Please address Dept. 46.

**The Willys-Overland Company**  
Toledo, Ohio





## IT'S KNOWN BY ITS 4 BIG FEATURES

Our magnificent new 1913 instrument is an example of highest development in the construction of a

### Magnetic Speedometer

The magnetic principle is the only scientific principle of speedometer construction. It is—by far—the most costly construction. The magnetic principle—alone—permits the use of a frictionless indicating means and of low speed, non-vibrating drive.

Model B  
\$50

## THE NEW 1913 Stewart Speedometer

### Has Four Splendid Features

The New 1913 Stewart Speedometer has the new "reversed" revolving Speed Dial with Zero Stop mounted on full jeweled bearings and operated by Tungsten steel magnet, Stewart "closed ring" type. Steady and accurate at all speeds. Read at a glance

### We Threw It Away!

#### Our Old Centrifugal Type Speedometer

The first speedometer we made was of the centrifugal type—but long ago we cast it upon the scrap heap of the obsolete—

—because the governor of a centrifugal instrument must revolve at a high speed of over *two thousand five hundred revolutions* to the mile, causing vibration and bearing friction that no instrument can stand.

—because the centrifugal type *will not indicate* any speed under 7 miles an hour!

—because continued accuracy with a centrifugal type of speedometer is utterly impossible. It is necessary to multiply the movement of the indicating means *sixteen times* in order to get a movement of the pointer hand sufficient to permit the use of a scale large enough to be readable. *Therefore, any error in accuracy is multiplied sixteen times!*

—because our new and perfected type of **MAGNETIC** speedometer has rendered all types of centrifugal speedometers crude and obsolete!

It has a big, sturdy 100,000-mile Season Register, operated by "direct drive" gears and controlled by "Geneva Stop" mechanism.

It has a 100-mile Trip Register that can be rapidly reset to any tenth of a mile and without disturbing the record of the Season Register. This is an excellent feature for motorists when following instructions of route book while touring.

It has the Grade Indicator with revolving dial mounted on polished bearings and operated by gravity. Shows the various percentages of grades from zero up to 30 degrees.

IF YOU DESIRE PERMANENT SATISFACTION SEE THAT THE MAGNIFICENT NEW 1913 STEWART SPEEDOMETER IS INSTALLED ON THE CAR YOU BUY

### Stewart-Warner Speedometer Corporation

Factories at Chicago and Beloit

General Offices: 1931 Diversey Blvd., Chicago

New York  
Philadelphia  
Denver

Los Angeles  
Indianapolis  
Pittsburgh

Chicago  
Cleveland  
Portland

Minneapolis  
Boston  
Seattle

Kansas City  
St. Louis  
Atlanta  
Toronto

San Francisco  
Buffalo  
London

Detroit  
Cincinnati  
Paris





# SHELDON

## AXLES

We couldn't improve on the construction of the Sheldon Axle so we are offering new features in design and equipment in order to maintain the position of Sheldon dominance.

Our new heavy service axle has the yoke arms bushed with Tobin bronze because it is at these two points that the greatest wear takes place.

Friction is reduced to a minimum by the presence of wide openings on the yoke.

Perfect lubrication and the minimizing of wear are brought about by numerous well-placed oil cups.

All these features are combined with Sheldon design and construction to make the greatest truck axle ever put on the market.

But not content with our product in itself, we are going one step further and we offer with our 1913 axles the following bearing equipment:

Standard Tapered Roller Bearings.  
Bower Straight Roller Bearings.  
New Departure, Rhineland, F & S, Hess-Bright, or  
any standard Double Row Annular Bearings.  
Single Row Annular Bearings can be supplied without  
difficulty by using spacers.

This combination of the Sheldon Heavy Service Axle with a choice of any of the world's best bearings should not be overlooked by the truck manufacturer who wants the best.

### SHELDON AXLE CO.

WILKES-BARRE, PA.

CHICAGO BRANCH  
DETROIT BRANCH

68 East 12th St.  
1215 Woodward Ave.

When Writing to Advertisers, Please Mention Motor Age.

# The Delivery Car That Has "Made Good"



## Lippard-Stewart

### The Delivery Car

#### CHASSIS

List - \$1650

#### 'BODIES

Standard Panel - \$150

Standard Express - \$125

## The Lippard-Stewart Model "P" 1500 lb. Delivery Car 30 Horsepower

When you choose a Delivery Car select it as you would an employee who is most vital to your business. Go over its past record. Find out what it has done for others—what it will do for you. Analyze the car in every detail. Not merely its outward appearance but every detail of its construction. Know your car—know its makers—know its ability to fulfill your requirements. Intuition will tell you that the Lippard-Stewart is a good car, but analysis, comparison with other cars, past record and logical reasoning will prove to you that it is the peer of all cars for light delivery purposes.

**Sound Commercial Car Construction** is the basis of the Lippard-Stewart's supremacy. It is purely a delivery vehicle. Designed and built a commercial vehicle from tires to top, from tailboard to head light. It represents the practical ideals of men who have made a careful study of transportation and delivery problems. That is why it fulfills the demands of every business man or company whose need is a prompt, efficient and economical delivery system. It has demonstrated in almost every instance that it will deliver more goods over a wider territory than is possible with horse and wagon. Its dependability is a proven fact. It does its work well in fair weather and foul and is ready for every emergency.

**It Represents Economic Delivery** not only because it will deliver more goods than a horse-drawn vehicle at less cost per package, but because it is low in first cost and economical in upkeep. It economizes in real estate. It eliminates the time, trouble and incidental expenses always demanded by live stock. It does away with uncertainty and gives you actual assurance instead. Last but not least, it actually pays for itself with the increased business it makes possible and the money that it saves.

**Analysis of the Car Proves Its Serviceability**—Its Superiority. Examine its perfect chassis—strong yet simple

in construction—its frame built heavier and wider at the point of greatest stress. Note the 30-Horsepower Continental Motor. Consider the rugged cone clutch and the transmission strong enough for a 50 H. P. car. Observe the shaft drive, the differential, the simplicity of construction practiced throughout the entire building of the car—the easy get-at-ability of every important mechanical part even when the car is loaded. Look at the perfect spring suspension that assures easy riding and minimizes wear and tear. Then

**Consider the Price of the Car**—its sound dollar for dollar value. Compare it with any car apparently competing with it. Note how the Lippard-Stewart Car actually baffles competition. If you are a prospective purchaser, note the real worth of the car. If you are a dealer, form your own conclusions as to the car's value as a business investment—its ready salability and the quick turnover of capital it assures.

**Note the Comprehensive Lippard-Stewart Line**—the volume of sales it makes possible—a line that offers you a car to meet the specific demands of practically every firm and individual who need a delivery car regardless of their business—a line that knows no dull seasons and a car that practically sells itself and stays sold winter or summer.

**Read These Special Features** of Lippard-Stewart Construction: Continental 30 H. P. Motor, Eisemann Magneto, Brown-Lipe Selective Transmission, Cone Clutch, Full Floating Timken Rear Axle, Timken Roller Bearings throughout, Left Hand Drive, Pneumatic Tires, 35x4½ Front and Rear—full equipment of Lamps and Tools.

**We Want Good Dealers Everywhere.** We have a wonderful business proposition to offer the man who can measure up to our standards of integrity and business ability. Territory is being allotted fast. If you are interested wire us at once. If we have no dealer in your locality, we'll send you our proposition by return mail.

**Lippard-Stewart Motor Car Co.**  
Buffalo, New York

Manufacturers of 1500 lb. Delivery Cars of Every Description  
AUGUST BECKER, President. E. J. BARCALO, Treasurer.  
J. C. MILLAR, Secretary. C. S. DAHLQUIST, Chief Engr.  
W. F. REYNOLDS, Sales Manager.

LIPPARD-STEWART MOTOR CAR CO.  
Buffalo, N. Y.

(M.A.)

Please send catalogue and dealer's proposition immediately.

Name.....  
Street.....  
City..... State.....



# One Look Tells Everything

The  Visible Spark Plug lays bare all ignition troubles

The "visible gap" is an open "window" giving you a full view of the internal workings of your spark plug.

If the spark is seen jumping the gap, look for your trouble between the gap and sparking point.

If there is no spark in the gap, your trouble is behind the plug—in magneto, or batteries, or coil, or wiring.

But for the "visible gap" it would take you many precious minutes—often hours—to locate the seat of trouble.

**\$1.00** Buys this great new Spark Plug

Indicates in which way trouble lies.  
Facilitates timing of engine.  
Intensifies spark in cylinders.  
Consumes only minimum current.  
Gap adjustable—can be closed entirely.  
Permits regulating spark for any cylinder.  
By widening gap plug cleans itself.  
Costs same as any good plug.—\$1.00

Dealers will find J. D. Visible in greatest demand



## Visible Idea Worked Out Perfectly for the First Time

The "visible gap" feature, so far as being incorporated in a plug, has always seemed as far away as perpetual motion. The visible feature has been marketed in a separate device for years, but this is the only plug embodying the visible feature in a practical manner.

It is simple. Merely a hole in the porcelain and a spiral action to regulate length of the gap in the central electrode which carries the current.

The hole in no way lessens the strength of the plug, and the current in jumping the "visible gap" loses none of its efficiency. On the other hand it intensifies the spark at the gap in the cylinder.

Additional prestige is lent the J.-D. Visible Spark Plug by the fact that it is being introduced by the largest manufacturers of spark plugs in the world. We are exclusively manufacturers of spark plugs; we make millions of them each year.

The J. D. Spark Plug was a famous plug before it was improved by the visible feature. It combines finest workmanship, best materials and simplest designs.

Every part of this plug is made in our factory—even the porcelain being produced in our own potteries from clays and other ingredients imported from Europe.

This unequivocal guarantee goes with all our spark plugs:

**"Your money back or a new plug if you are not satisfied."**

If your dealer hasn't the J.-D. Visible yet, send your money direct to us for a set, SPECIFYING SIZE WANTED AND MAKE OF MOTOR, and we will ship them postpaid. Remember, the J.-D. Visible Plug is only \$1.00. Write today for our literature on ignition. It is free.

**Jeffery-Dewitt Company, 551 Butler Ave., Detroit, Mich.**

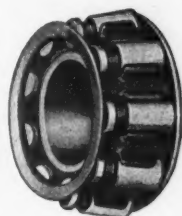


## The Man in the Box

¶ An air of mystery pervades the carbonizing department of the Timken Plant. Smoke rises from rows of glowing furnaces. Red, white and green signal lights shine through the haze. 'Devil wagons' dive into lurid ovens after red hot pots of carbonized parts.

¶ And off in a corner, quietly watching and guiding it all sits the 'man in the box.'

Timken  
Tapered



Roller  
Bearing

¶ To the carbonizing room come all the cups, cones and Rollers for the Timken Bearing. Accurately made as they are, from the best of steels, by the finest automatic machinery, they are far from fit for service in the motor car.

¶ In this huge room the parts are carefully packed in iron pots with a mixture rich in carbon. Then heated in furnaces to just the right temperature for just the right length of time.

¶ Carbon from the black mixture penetrates the skins of the cups, cones and rollers so that, later, the surface of each part can be made glass-hard to resist wear while the core remains soft and elastic to withstand shocks.

### Time-Tried Formulas

¶ The time in the furnace and the degree of heat, vary for each particular size of cup, of cone, of roller. The exact formula for each has been developed by years of experiment and study.

¶ The formulas have been proved right by minute records of results in service. Records that cover millions of Timken Bearings in hundreds of thousands of cars.

### Must be Followed

¶ It's the duty of the man in the box to *know* that the formula for every size of every part is followed exactly by the furnace men. And this is how he knows it:

¶ Wires lead from an electric resistance thermometer in each furnace to a switchboard in his box. Every quarter hour he connects

each oven with the pyrometer before him, reads and records its heat and compares it with the formula for the size of the part that particular furnace contains.

¶ Other wires from the box carry order signals back to each oven. Red, white and green lights tell the furnace man to slightly raise or lower the heat or to hold it as it is.

### Correct Design Won First

¶ Years ago no such painstaking care was used in making the Timken Bearing. Yet even in those days its unique design was right—its principles have never been changed. They have proved right in the crucible of service.

¶ But years of striving towards perfection in every process of manufacture have added to rightness of design a very real though a less important value.

## The Timken Roller Bearing Company

Canton, Ohio, U. S. A.

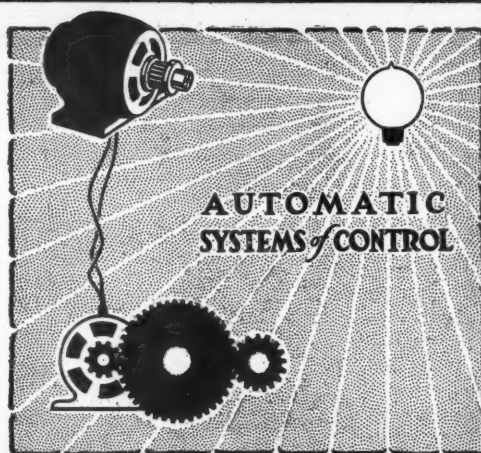
*The only axle manufacturer licensed to make automobile axles equipped with Timken Roller Bearings is the Timken-Detroit Axle Company*



# The Ward Leonard System

*No car complete without it*

**WARD LEONARD**



**Lighting - Starting**

The completely equipped car of the future will as surely have a reliable and efficient lighting and starting system as it will have tires.

The motoring public has been educated to demand electric lighting and starting, and its demands can be easily and satisfactorily met by the installation of the WARD LEONARD SYSTEM. Motorists want electricity to light and start their cars. Manufacturers have always desired to give it to them, but they have failed because they have absolutely missed the connecting link between satisfactory lighting and starting, and the automatic control of the lighting dynamo.

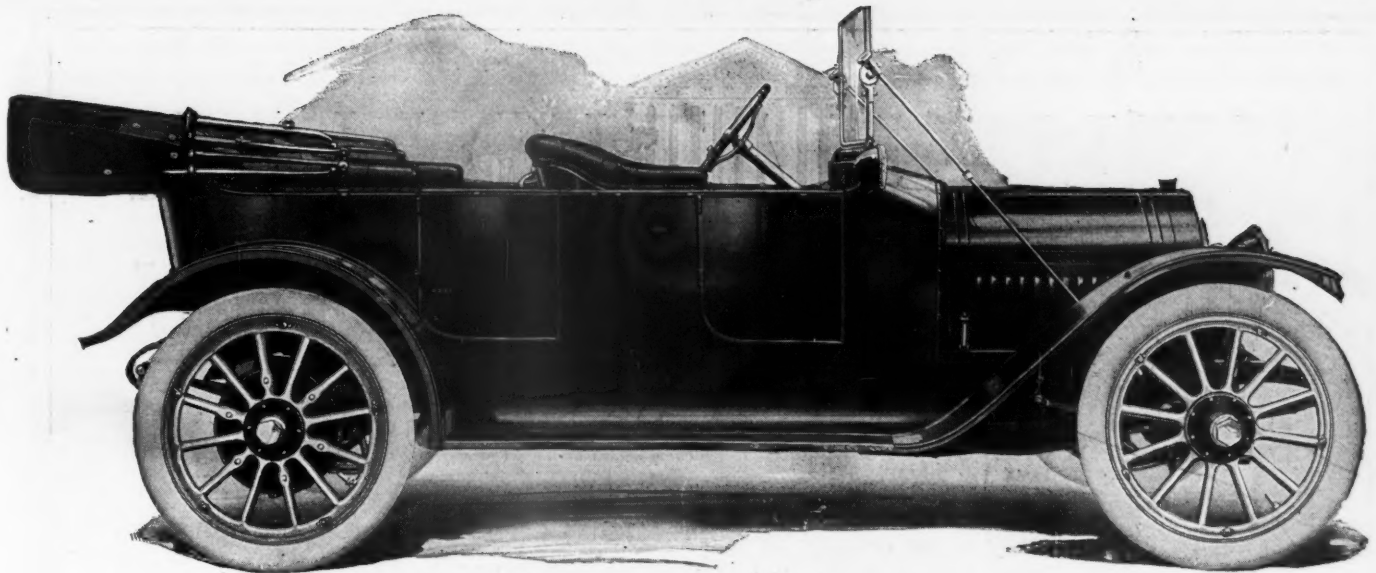
It is this control of the dynamo that gives the WARD LEONARD user satisfaction with

his lighting and starting outfit. We use a shunt-wound dynamo for lighting and a series motor for starting. Every electrical engineer knows that the use of these two standard devices, not joined in the same unit, represents the height of electrical experience and judgment.

No guess work about the WARD LEONARD SYSTEM. Its electrically operated switch controls the amperage with absolute regularity, regardless of the speed of the automobile.

Engineers the world over have endorsed the WARD LEONARD design. Satisfied users in all parts of the earth testify to the practical perfection and the unerring operation of the finished WARD LEONARD product.

**WARD LEONARD ELECTRIC CO.**  
BRONXVILLE, N. Y.



THE SENSATION OF THE "BIG SHOWS"

## A MASTER CAR AT A MATCHLESS PRICE

Claims are the easiest thing in the world to make. Automobiles that will live up to them are, as Kipling says, "Another Story." One of the most common remarks among the big corps of experts maintained at our factory is "If the public only knew."

Here's a car that has a claim on your interest—not on what we think it will do—but on what it has already done. No car can approach the Dreadnought-Moline's record in the country's most important Reliability and Economy Events.

### READ IT'S RECORD

Perfect Road Score Glidden Tour, 1909.  
Won Chicago Trophy, Glidden Tour, 1910.  
Won Fort Worth Six-Day Endurance Run, 1910.  
Perfect Road Score, St. Louis Star-Telegram Run, 1910.  
Perfect Road Score, Washington Post Run, 1910.  
Won Touring Trophy, Annual Economy Run, 1910.

Won Team Trophy, Chicago Reliability, 1910.  
Won Team, Tied for Touring Trophy, Chicago Reliability, 1911.  
Won Roadster Trophy, Chicago Reliability, 1911.  
Won Roadster Trophy, Chicago Reliability, 1912.  
Won Team Trophy, Chicago Reliability, 1912.

# Dreadnought Moline M-40

### 20 Exceptional Features of the M-40

10-inch more Wheel Base (124 inches)  
Electric Lights  
5 more Horsepower (Full 40)  
Improved Steering Gear  
Gasoline Tank Under Cowl  
Indicator and Filler on Dash  
Improved Springs

Inside Control  
Ten-inch Upholstery  
Turkish Spring Cushions  
Flush Side Bodies  
Nickel Trimmings  
Long Stroke Motor—40 H. P.  
Enlarged Brakes

Self-Starter  
Large Wheels and Tires  
Exceptionally Roomy Body  
Demountable Rims (set of five)  
Dual Ignition System  
Carburetor Dash Adjustment  
Rain Vision Windshield

### \$1950 NEVER BOUGHT MORE CAR VALUE

From it's famous long stroke motor—the first of its type built in America—to it's smart appearance, the Dreadnought-Moline will please you. It's ample power meets every emergency. In design—in construction

and in finish the Dreadnought-Moline is built to satisfy. Its 10 year record of success proves that it does it. \$1950 never bought more real automobile value than is represented in the Dreadnought-Moline M-40.

### GET THIS REMARKABLE DOCUMENT

We have written a catalog that is different. From cover to cover it is packed with interesting automobile information. Whether you have owned one car or a dozen, our latest book will prove interesting to you. Write for a copy now—while it is in your mind.

**DEALERS:** Write for our "Square Deal" proposition. The most liberal agency offer of 1913.



**MOLINE AUTOMOBILE COMPANY., 101 Keokuk Street, East Moline, Ill.**

*When Writing to Advertisers, Please Mention Motor Age.*



# THE NATIONAL AUTO SHOW



Under Auspices of National Association  
of Automobile Manufacturers, Inc.

At  
**CHICAGO**

**Coliseum and 1st Regiment Armory**

**February 1 to 8**

**Passenger Vehicles**

**Parts and Accessories**

**February 10 to 15**

**Commercial Vehicles**

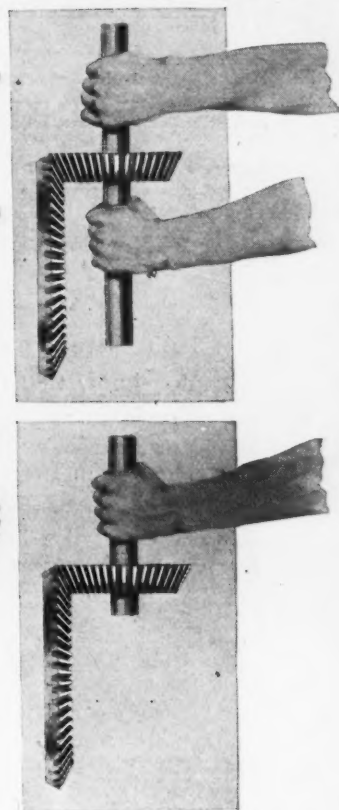
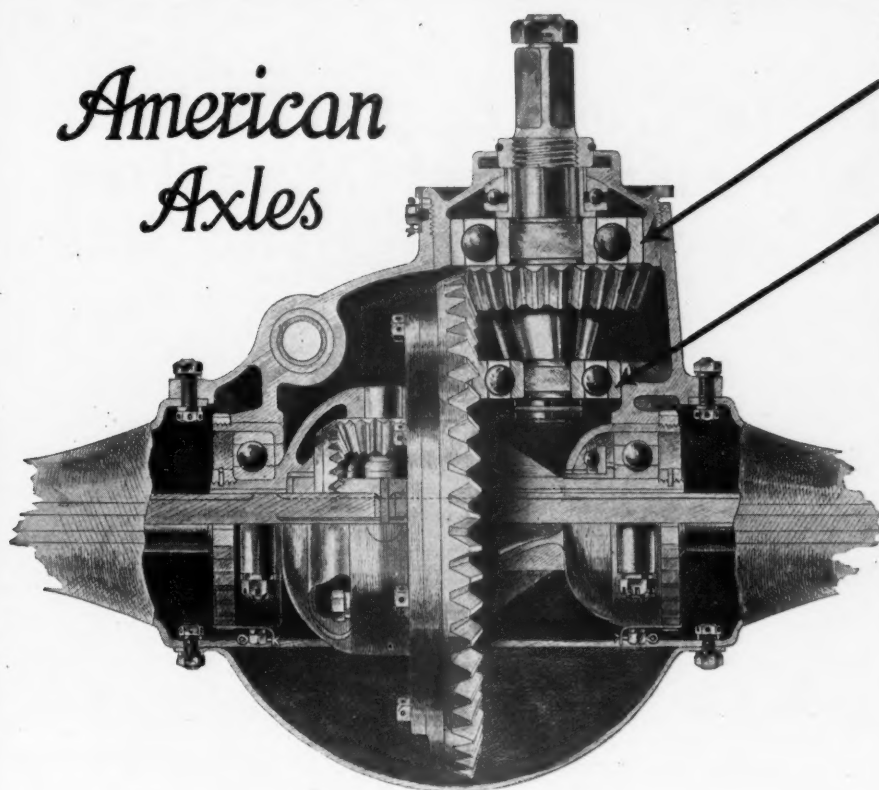
**Parts and Accessories**

**The Entire Trade, in One Comprehensive Exhibition  
For the Thirteenth Consecutive Season**

**S. A. MILES, Manager**

**Auditorium Hotel, Chicago**

## American Axles



### An Important Detail of American Axle Construction

In *American Axles* of the bevel gear type, the pinion shaft is supported by bearings on both sides of the pinion. The shaft is, therefore, held in place in the strong and stable manner typified by the two hands in the small, upper illustration.

Cheaper construction omits the inboard bearing and endeavors to support the shaft in a one-handed fashion which proclaims its own weakness.

To add the inboard bearing, with its support an integral part of the housing, might be considered costly practice for cars sold at the lower prices, but for cars that must have the best of construction, the cost is more than justified in the continued maintenance of the originally perfect meshing of the gears, and the entire absence of noisy vibration.

*American Axle* equipment instantly establishes in your mind a sense of highest class: it supplies a basis by which you can unerringly judge a car.

*The American line includes, besides our bevel gear, the Lanchester-Daimler Worm Drive, to which we have exclusive rights as axle manufacturers in America.*

**THE AMERICAN BALL-BEARING COMPANY**  
CLEVELAND, OHIO



## "THE LIGHT UNIVERSAL"

**"In Exchange for Your Empty Tank, Accept Only a Genuine Prest-O-Lite Tank, Filled with Genuine Prest-O-Lite Gas"**

This is the message that is going to Prest-O-Lite users everywhere.

In it there is a hint for the wise dealer, as well.

You know that no imitator of Prest-O-Lite has ever successfully imitated Prest-O-Lite Service.

You also know that no imitator ever made good the large claim "more gas and better gas than Prest-O-Lite."

So does your customer.

Imitations are getting harder and harder to sell. There are now mighty few dealers trying it.

Most of those who yielded to the old but ever tempting claim, "More Profits," have come back home.

To the dealer who is still trying to force imitations on people who won't have them, perhaps because he has money tied up in them, we can only say:

"The sooner you resume earning your good old Prest-O-Lite profit, the sooner you will make your income what it used to be."

**THE PREST-O-LITE CO.** 233 East South St.  
Indianapolis, Indiana  
Canadian General Office and Factory, Merritton, Ont.

Branch Offices and Service Stations in all principal cities.  
Charging Plants in all parts of the country.  
Extensive foreign service.

**EXCHANGE AGENCIES EVERYWHERE**

# NEW DEPARTURE

## Ball Bearings

**Guaranteed Materials  
Guaranteed Accuracy  
of Dimension  
Guaranteed Uniformity**  
**signify**



**Guaranteed Quality  
Guaranteed Service  
and Capacity  
Guaranteed Durability**

No ball bearing is so carefully made, closely gauged, persistently inspected and insistently standardized.

### THREE TYPES

**Double Row:**—a combined radial and thrust bearing, taking load from any direction and successfully replacing combinations of single row and thrust.

**Single Row:**—made in standard sizes,—a superior, strictly radial bearing.

**"Radax":**—a high grade cup and cone type, taking radial load and one direction thrust.

Catalog, data sheets and consultation service of our engineering department are yours for the asking.


AMERICAN MADE  
FOR  
AMERICAN TRADE

**THE NEW DEPARTURE MANUFACTURING CO.**  
**BRISTOL, CONN.**

Western Branch: 1616-17 Ford Building, Detroit

AMERICAN MADE  
FOR  
AMERICAN TRADE

*When Writing to Advertisers, Please Mention Motor Age.*



ABOVE is the well-known Gabriel Single Tube Horn, famous for its beautiful tone and unequalled road-clearing qualities. It is not one of the passing novelties that have appeared from time to time, but the most efficient and reliable motor alarm that has yet been produced.

## GABRIEL REBOUND SNUBBER

Motorists who are desirous of obtaining the comforts produced by flexible springs without the unpleasant feature of being bounced and jolted from the seat on rough roads should invest in a set of Gabriel Snubbers. They make motoring a real pleasure and pay for themselves in a short time by protecting the car from vibration and saving the tires by giving better traction.



NO—Noise, Rattle, Adjustment, Side Swaying or Bouncing

## GABRIEL "MUSICAL WONDER" HORN



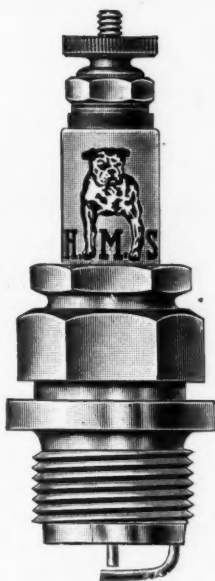
All the popular airs as well as the old time melodies can be played on this horn. It is also suitable for regular signal purposes. A horn that is in keeping with the finest motor cars.

ASK FOR CATALOG AND AGENCY PROPOSITION

GABRIEL HORN MFG. CO., 1415 E. 40th Street, CLEVELAND, OHIO

# H.M.S. BULLDOG

## Spark Plugs



For nearly forty years our products have been recognized everywhere as *standard* and of the *highest grade*.

The H. M. S. Bull Dog Spark Plug maintains this reputation in still another field.

*Write for Our Proposition*



THE HARTFORD MACHINE SCREW CO.

NEW YORK Office and Warehouse, 88-90 Walker St.

Hartford, Conn.

DETROIT Office and Warehouse, 878 Woodward Ave.



# WARNER-TOLEDO

T. W. WARNER, Pres.—Gen. Mgr.

## GUARANTEED

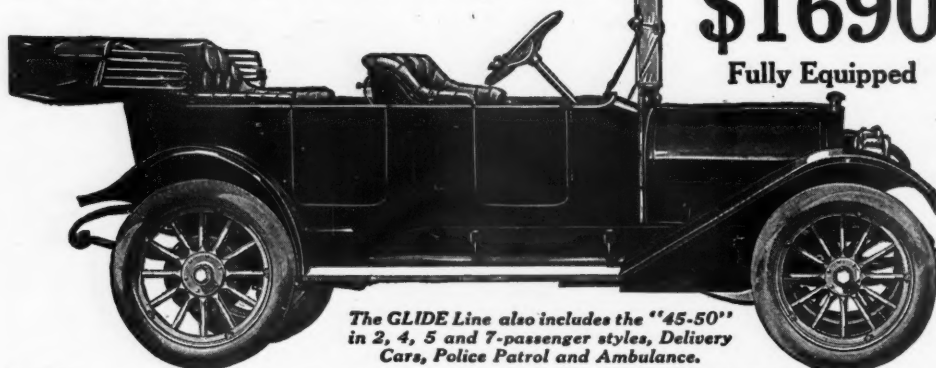
Gear Shift Levers  
Steering Gears  
Transmissions  
Differentials  
Electric  
Starters

THE WARNER MANUFACTURING CO.  
TOLEDO, OHIO

GLIDE "36-42" in 2 and 5-Passenger Bodies

**\$1690**

Fully Equipped



The GLIDE Line also includes the "45-50" in 2, 4, 5 and 7-passenger styles, Delivery Cars, Police Patrol and Ambulance.

## The Popular QUALITY Car

THE GLIDE "36-42" is strictly a QUALITY car—only the best known quality of materials has been used.

The GLIDE is a pleasure car—not a worry wagon. The great strength, simplicity and accessibility of all its working parts enable you to leave your worries behind.

### Latest Equipment

The new Motor-Driven Tire Pump saves your strength, your time, your temper. Also saves your tires by keeping them fully inflated.

The Electric Lighting System is another of the GLIDE'S high-class features. Simply touch a button.

Electric Bull's Eye Side Lamps are sunk in dash, adding to the GLIDE'S appearance, eliminating all rattling and minimizing chances for breakage.

The GLIDE Self-Starter is sure of a spark, regardless of whether the points of the magneto are together or not.

Center Control, Left Side Drive, Floating Rear Axle with Pressed Steel Housing, Baker Bolted-on Demountable Rims, Goodyear No-Rim-Cut Tires—are all found in the 1913 GLIDE "36-42."

### The GLIDE Price

enables you to own a highest-class, top-quality car without paying enormous and unreasonable profits.

Write NOW for detailed descriptive circular.

No other car gives you the up-to-date, efficient, luxurious GLIDE equipment, together with GLIDE structural quality and GLIDE service—at anywhere near the GLIDE price.

Write NOW for detailed descriptive circular.

### Dealers

A GLIDE agency will be worth thousands of dollars to you. Open territory can be obtained NOW upon very attractive terms. Don't let this exceptional opportunity slip through your fingers. If you do, you'll regret it. Write us TODAY.

## GLIDE "36-42" FEATURES

- Automatic Dynamo Lighting System
- Motor-driven Tire Pump
- Unit Power Plant
- Long Stroke Motor with Enclosed Valves
- Center Control
- Left Side Drive
- Electric Side Lamps in Dash
- Electric Headlights and Tail Lamp
- An Efficient Self-Starter
- Floating Rear Axle with Pressed Steel Housing
- 118-inch Wheel Base
- Demountable Rims (Baker bolted-on)
- Goodyear No-Rim-Cut Tires

*Glide*

THE BARTHOLOMEW CO., - 215 Glide Street, Peoria, Illinois

# The Triplex Ford Engine Starter

You do not have to leave your seat to start your Ford Motor when equipped with the Triplex Starter.



All that is necessary is to pull the lever. Will absolutely start your Ford 1000 times out of 1000.

Can be easily attached by any one in one hour's time. Absolutely no mechanical work necessary to install same. Absolutely guaranteed to outlast your Motor.

To be had at all dealers or direct on receipt of price.

Dealers: Write for our sales proposition TODAY For further information write us.

Price \$11.50

WESTERN REPRESENTATIVES

AUSTERMELL & HANSON

560 Phelan Building, San Francisco, Calif.

BREMER-WILSON MANUFACTURING CO.

1256 Michigan Ave. Dept 14 Chicago, Ill.

# Mosler Spit Fire Plugs are the BEST

SPIT-FIRE PLUGS SHOOT A FLAME

SPIT-FIRE PLUGS HAVE A DEEP CHAMBER

SPIT-FIRE PLUGS USE A PETTYCOAT PORCELAIN

SPIT-FIRE PLUGS WITH PLATINUM POINTS LAST LONGEST

USE GENUINE SPIT-FIRE PLUGS

IF YOU EXPECT THE BEST

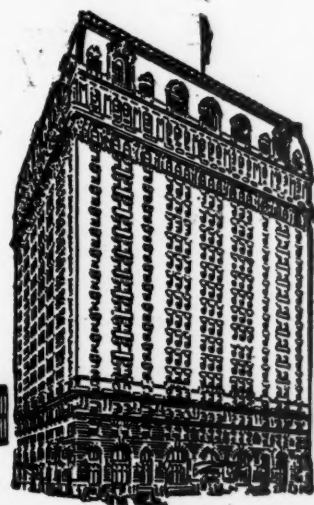
RESULTS FROM YOUR MOTOR

A. R. MOSLER & CO.

P. O. BOX "M" MT. VERNON, N.Y.



452



## Hotel La Salle

CHICAGO'S FINEST HOTEL

ERNEST J. STEVENS, Vice-Pres. and Mgr.

Located in the heart of the city, within easy reach of all railway terminals

### RATES

ONE PERSON { Room with detached bath.....\$2 to \$3 per day  
Room with private bath.....\$3 to \$5 per day  
TWO PERSONS { Room with detached bath.....\$3 to \$5 per day  
Room with private bath.....\$5 to \$8 per day

### TWO CONNECTING ROOMS WITH BATH

Two persons.....\$5 to \$8 per day  
Four persons.....\$8 to \$15 per day  
SUITES.....\$10 to \$35 per day

LA SALLE AT MADISON STREET, CHICAGO

## Make Your Top Like New

Before

After

The next time you take your car out, look at the top—inside and outside. Those streaks of gray on the cover, those spots on the lining indicate your top is fast going to pieces. You can save that top and make the lining clean and like new quickly, easily and cheaply by using

**RUB-R-TITE AUTO-TOP WATERPROOF GUM-SURFACING**

**RUB-ON CONCENTRATED LINING-DYE**

Applied with a brush, it gum-surfaces Mohair, Pantasote or Rubber tops, making a durable, waterproof surface as flexible as leather. It transforms an old top into a new one and covers up the fabric under the Gum-Surfacing. Almost unbelievable results can be accomplished by its use. By reducing Rub-R-Tite with an equal part of gasoline, some cloth tops can be most effectively and cheaply colored black and waterproofed with one coat—new tops treated thus will have twice the usual life.

Will evenly dye any spotted or faded top—lining perfectly black with one application. Put on with a sponge, without removing the top. Comes in concentrated form, does not attack rubber or separate fabric. Goes into the cloth and spreads in all directions, insuring an even color that cannot wash out or run when the top is wet. It will not fade more than a new cloth. Made in black only—other colors are impractical.

These two products and our Stay-On-Enamel for renewing Lamps, Horns, Radiators and Fenders, and our Sta-Fix Radiator Mend, which stops leaks without soldering—are all recognized as standard goods everywhere. Keep these yourself, or have your garage-man keep them on hand, same as gasoline or oil—they will improve the appearance of your car, save you money, trouble and repair bills.

### Every Can Guaranteed to Satisfy

Most supply-houses carry these goods. If you want your car to keep new or you want to renew its shabby parts, ask your dealer or garage-man for our products. If he hasn't them, send us a postal with your name and address and we will promptly send price-list, information and samples of work FREE.

RUB-ON-MANUFACTURING COMPANY, Dept. WB, BUFFALO, N. Y.  
Garage Men and Dealers: Write for Special Trade Proposition



# Nickel Polish

## AT LAST!

ARE YOU LOOKING FOR  
A METAL POLISH THAT  
WILL POSITIVELY RE-  
MOVE WATER SPOTS  
FROM NICKEL?

DIAMOND VELVET



METAL POLISH

IS GUARANTEED TO DO IT  
WITHOUT INJURING THE  
NICKEL OR ENAMEL, AND IT  
IS EQUALLY AS GOOD FOR  
BRASS OR OTHER METALS.

For Sale by All Good Dealers, or Direct from

### Diamond Specialty Company

953 Ft. Wayne Avenue  
INDIANAPOLIS, IND.

DEALERS—We have the polish you have been looking for. Wire or write us at once.

## *Profit by our experience*

When Chrome Vanadium Steel was first brought before the manufacturing fraternity men marveled at its toughness, ductility, and elasticity.

This company was congratulated time and time again for introducing a product for which the industries of the world had waited and wanted.

But each succeeding year a marked improvement was noted in the quality of this steel, experience was telling, and longer experience has told to an even greater extent, as **our Chrome Vanadium Steel** of today represents the acme of perfection in Vanadium Steel.

This steel is made under our own secret process, patent for which is now pending.

*May we figure on your requirements?  
Drop us a line.*

**The United Steel Company**  
Canton, Ohio

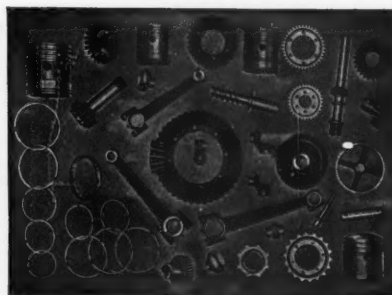
Branches: New York, Chicago, Detroit,  
Cincinnati

## AUTOMOBILE PARTS

Specialization Means Superiority

### OUR PRODUCTS

Pistons	Cam Shafts
Piston Rings	Motor Gears
Piston Pins	Valves
Transmission Gears	



Producing a large volume of Automobile and Motor Machine Parts, we offer you a superior product at a consistent price, and rid your factory of troublesome details. Let us also submit estimates on your

die-cast Bearing Bushing requirements. We have a special department of our business devoted to this product.

We make a special point of Helical Cut Motor Gears, the only correct solution of the motor gear problem, and Integral Cam Shafts, with cam Contours ground after hardening.

**THE F. W. SPACKE MACHINE CO.**  
INDIANAPOLIS, INDIANA

# Marion

## Westinghouse Electric Starter on Marion Cars

The Marion 48-A, the Marion de luxe, is now equipped with Westinghouse electric self-starter, \$1850 complete.

Marion models 36-A, 37-A, and 38-A, 30-40 h. p. cars, \$1425 to \$1475, can be supplied with this electric starter instead of gas starter, for \$120 extra. This is at cost and is \$50 less than the prevailing prices for electric starters.

This self-starter in operation may be seen at the shows. In Chicago at

### 2450 Michigan Avenue

The Marion Motor Car Co.

902 Oliver Avenue

Indianapolis

## REMY MAGNETO

*Chosen By America's Leading Manufacturers*

More Remy Magneto are being used on 1913 American Automobiles than all other makes combined.

Our contracted sales for 1913 are Five Times Greater than in 1912. We ship over 13,000 Remys monthly.

This is an expression of the confidence of this country's foremost manufacturers in Remy Magneto and the facilities of the Remy plant in Anderson, Indiana.

See that a new Remy is on the car you buy.

Exchange your old magneto (any make) for a new 1913 Remy; it will cost you practically no more than repairs on your present ignition system.

**The Remy Electric Co., Anderson, Ind.**

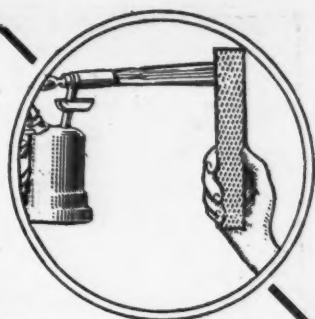
Chicago Show—Space 66, Coliseum Balcony

Service Stations: Anderson, Ind.; Albuquerque, N. M.; Atlanta, Ga.; Baltimore, Md.; Birmingham, Ala.; Boston, Mass.; Buffalo, N. Y.; Charlotte, N. C.; Chicago, Ill.; Cincinnati, Ohio; Cleveland, Ohio; Columbus, Ohio; Dallas, Tex.; Denver, Colo.; Detroit, Mich.; El Paso, Tex.; Grand Rapids, Mich.; Houston, Tex.; Indianapolis, Ind.; Jacksonville, Fla.; Kansas City, Mo.; Los Angeles, Cal.; Louisville, Ky.; Memphis, Tenn.; Milwaukee, Wis.; Minneapolis, Minn.; Nashville, Tenn.; New Orleans, La.; New York City, N. Y.; Norfolk, Va.; Omaha, Neb.; Philadelphia, Pa.; Pittsburg, Pa.; Portland, Me.; Portland, Ore.; Providence, R. I.; Rochester, N. Y.; San Antonio, Tex.; San Francisco, Cal.; Savannah, Ga.; Seattle, Wash.; Spokane, Wash.; St. Louis, Mo.; Syracuse, N. Y.; Utica, N. Y.; Washington, D. C.; Canada—Vancouver, B. C.; Calgary, Alberta; Montreal, Que.; Winnipeg, Manitoba; Hamilton, Ont.; Toronto, Ont.

## You Can't Burn It

—not even with the flame of a powerful blow torch  
—a flame hot enough to melt iron!

This means that the most intense frictional heat has absolutely no effect on the brakes of your car when they are lined with



## J-M NON-BURN BRAKE LINING

This lining is made of pure Asbestos fibres interwoven with strong brass wires. Not a particle of inflammable or perishable material in it. Oil, gasoline, water, grit, etc., cannot affect it. Outlasts at least 12 ordinary linings.

J-M Non-Burn lining grips the brake drum and locks wheels almost instantly when brakes are applied. Yet by applying less pressure you can stop as gradually as you desire.

Sold by most dealers. Shipped direct if your dealer hasn't it. Name is on every piece.

Write nearest Branch for sample and interesting booklet

**H. W. JOHNS-MANVILLE CO.**

Albany	Cincinnati	Kansas City	New Orleans	San Francisco
Baltimore	Cleveland	Los Angeles	New York	Seattle
Boston	Dallas	Louisville	Omaha	St. Louis
Buffalo	Detroit	Milwaukee	Philadelphia	Syracuse
Chicago	Indianapolis	Minneapolis	Pittsburgh	1923

For Canada—THE CANADIAN H. W. JOHNS-MANVILLE CO., LIMITED  
Toronto Montreal Winnipeg Vancouver

## REMY MAGNETO

*Chosen By America's Leading Manufacturers*

More Remy Magneto are being used on 1913 American Automobiles than all other makes combined.

Our contracted sales for 1913 are Five Times Greater than in 1912. We ship over 13,000 Remys monthly.

This is an expression of the confidence of this country's foremost manufacturers in Remy Magneto and the facilities of the Remy plant in Anderson, Indiana.

See that a new Remy is on the car you buy.

Exchange your old magneto (any make) for a new 1913 Remy; it will cost you practically no more than repairs on your present ignition system.

**The Remy Electric Co., Anderson, Ind.**

Chicago Show—Space 66, Coliseum Balcony

Service Stations: Anderson, Ind.; Albuquerque, N. M.; Atlanta, Ga.; Baltimore, Md.; Birmingham, Ala.; Boston, Mass.; Buffalo, N. Y.; Charlotte, N. C.; Chicago, Ill.; Cincinnati, Ohio; Cleveland, Ohio; Columbus, Ohio; Dallas, Tex.; Denver, Colo.; Detroit, Mich.; El Paso, Tex.; Grand Rapids, Mich.; Houston, Tex.; Indianapolis, Ind.; Jacksonville, Fla.; Kansas City, Mo.; Los Angeles, Cal.; Louisville, Ky.; Memphis, Tenn.; Milwaukee, Wis.; Minneapolis, Minn.; Nashville, Tenn.; New Orleans, La.; New York City, N. Y.; Norfolk, Va.; Omaha, Neb.; Philadelphia, Pa.; Pittsburg, Pa.; Portland, Me.; Portland, Ore.; Providence, R. I.; Rochester, N. Y.; San Antonio, Tex.; San Francisco, Cal.; Savannah, Ga.; Seattle, Wash.; Spokane, Wash.; St. Louis, Mo.; Syracuse, N. Y.; Utica, N. Y.; Washington, D. C.; Canada—Vancouver, B. C.; Calgary, Alberta; Montreal, Que.; Winnipeg, Manitoba; Hamilton, Ont.; Toronto, Ont.



Front view 1/2 actual size.

**BOYCE**  
**MOTOMETER**  
PAT'S PEND'G

1913's TRADE SENSATION

**Know the Exact Heat of Your Motor While Driving**

The Motometer is a watch-like instrument fitted to the radiator cap, protecting the motor from damage caused by improper lubrication, overheating, defective cooling, etc. By means of a red fluid indicator it warns you

**When the Radiator Needs Water**

**When Oil Supply Is Insufficient**

In short, it tells whatever excessive heat tells—a broken water pump, a clogged pipe, a broken fan belt, etc., and tells before the damage is done.

Attached the same as an ornament, readily visible from the seat day or night. It will prevent frozen radiators in winter and cracked cylinders in summer. Finished in black enamel with gold plated or nickel rims.

Price \$10.00

**THE MOTOMETER COMPANY, Inc.**  
1788 Broadway, New York

Exhibiting at the Chicago Automobile Show, Space 18a, Basement



View from Seat.



# Never a Miss!



## HERZ PLUG

*"Bougie Mercedes"*

IS THE PLUG FOR A FAT, HOT SPARK

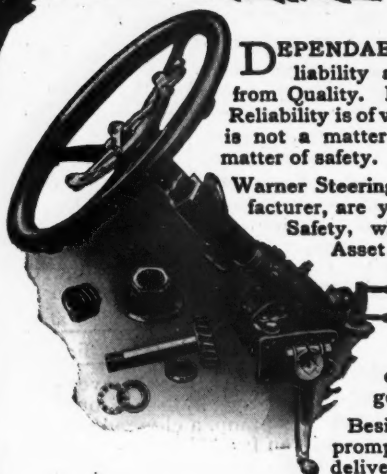
Four Sparking Points  
Platinum-Alloy Electrode  
Double Stone Insulation  
Self-Cleaning

\$1.50—Least expensive because it stands up best.

GUARANTEED A FULL YEAR  
and its average service is several times that long

HERZ & CO. 2931 Madison St. New York  
ASK FOR BLUE ENAMELED STONE

## Efficient-Reliable Steering Gears



**D**EPENDABILITY and Reliability are inseparable from Quality. In steering gears, Reliability is of vital importance. It is not a matter of money—it's a matter of safety.

Warner Steering Gears, Mr. Manufacturer, are your best pledge of Safety, which means a Big Asset in your business. You are justified in using them by our eight year old reputation for building the highest grade steering gears produced.

Besides, we give you prompt and dependable deliveries, service and satisfaction. Write.

We modify our designs to meet your detail requirements, or build to approved designs on seasons quantity specifications.

Detroit Office  
628 Ford Building

Philadelphia Office  
Glenwood Av. and 2nd St.

## Warner Gear Co. Muncie Indiana



MODEL

40

## JONES SPEEDOMETER

Stands for accuracy and durability in the mind of the experienced motorist. He has proven its worth by years of excellent service, and knows that under conditions which upset the ordinary speed indicator, the JONES is always true and accurate. That's the kind of a speed-indicator you want on your car.

## THE JONES SPEEDOMETER

Main Office: Bush Terminal, New York

New York: Broadway & 76th St.  
Chicago: 1430 Michigan Ave.  
Boston: 109 Massachusetts Ave.  
Philadelphia: 1427 Vine St.  
San Francisco: 530 Golden Gate Ave.

Buffalo: 20 Goodrich St.  
Los Angeles: 1229 S. Olive St.  
Portland: 329 Ankeny St.  
Seattle: 917 East Pike St.  
Detroit: 872 Woodward Ave.

## Every Auto Owner Needs This Wrench



### THE BEST TOOL ON EARTH

Grips Anything

No Adjusting

No Monkeying

Just throw it on and pull. Harder you pull, tighter it grips. Invaluable for use on small and intricate parts of autos and engines. Grips any nut, pipe or bolt. Individual mail orders promptly filled on receipt of price: 6 in., 25c; 9 in., 75c; 12 in., \$1.00; 16 in., \$1.25; 20 in., \$1.50.

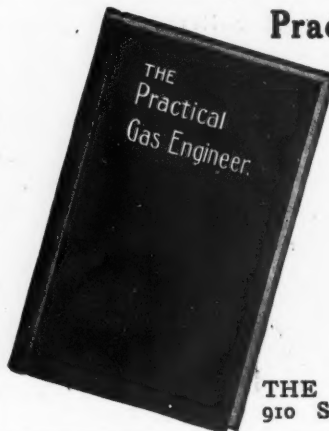
SEE IT AT THE SHOW

Dealers and Suppliers write for prices and terms

**CENTRAL WEST SUPPLY COMPANY**  
1657 Monadnock Building CHICAGO

## Practical Gas Engineer

By  
E. W. LONGNECKER



Twelve years' constant experience with Hydro-Carbon Engines. How to start, how to operate, and how to care for all classes of explosive motors or engines using gas, gasoline or similar fuels. A full and exhaustive chapter on electric and other systems of igniting. Every line tells something. Every page full of interest. A book of 172 pages, neatly bound in cloth. Sent postpaid on receipt of price, \$1.00.

THE CLASS JOURNAL CO.  
910 S. Michigan Ave., Chicago

# Veeder

## The Easiest Way

to figure on the mileage of motor-driven vehicles and keep track of gasoline or battery consumption, tire, lubrication and depreciation costs—also any promiscuous "joy-riding"—is to install a **VEEDER HUB ODOMETER**.

Neat, durable and compact, it can be easily attached. Price complete.

**\$25.00**

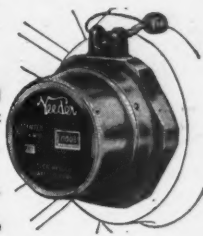
At your dealers', direct from our factory or at the following agencies:

**T. H. Cranston & Co.,** 56 E. Randolph Street, Chicago, Ill.  
**Bernard I. Bill,** 543 Golden Gate Avenue, San Francisco, Cal.

## The Veeder Manufacturing Company

**C. H. VEEDER, President**      **D. J. POST, Treasurer**  
**H. W. LESTER, Secretary**  
**HARTFORD, CONN.**

Makers of Cyclometers, Odometers, Tachometers, Tachometers, Counters and Small Die Castings



## Even with porcelain **BROKEN** it sparks perfectly



Unlike all other plugs, J-M Plugs spark just as well with the porcelain broken as when it is whole—even when the current is supplied by a high tension magneto.

This perfect sparking service is made possible by the double insulation of the

## J-M Spark Plug

There are two absolutely independent insulations in the J-M Plug—an inner insulation of mica protected from injury by a porcelain insulation. If the porcelain is broken, the mica prevents current leakage, and sparking will be just as strong as if the plug were not damaged.

Other exclusive features of the J-M Plug are—

Case hardened center electrode that cannot expand and contract when heated by the engine. All joints packed with asbestos or high temperature cements, baked so that they never require adjustment or "tightening up."

Look for name "J-M" on every plug. Shipped direct, prepaid, from our nearest branch on receipt of price, \$1.00, if your dealer doesn't sell them.

Ask our nearest branch to send you booklet.

## H. W. JOHNS-MANVILLE CO.

Albany	Cincinnati	Louisville	New Orleans	San Francisco
Baltimore	Cleveland	Milwaukee	New York	Seattle
Boston	Dallas	Minneapolis	Omaha	St. Louis
Buffalo	Detroit	Kansas City	Philadelphia	Syracuse
Chicago	Indianapolis	Los Angeles	Pittsburgh	(1933)

For Canada:—THE CANADIAN H. W. JOHNS-MANVILLE CO., LIMITED.  
 Toronto      Montreal      Winnipeg      Vancouver



## Johnson Trucks

**1-Ton**  
**2-Ton — Chasses**  
**4-Ton**

Write for Specifications

**JOHNSON SERVICE CO., Milwaukee**



TYPE A. B. AMMETER  
 (made also with center zero.)

## No Lighting Engineer

would consider an electric lighting installation complete unless suitable meters were included.

Is your Auto Lighting Plant complete?

## HOYT METERS

Have Proved Their Worth in Automobile Lighting.

Ask for Bulletin Seven

**Hoyt Electrical Instrument Works**  
**Penacook, N. H.**



32,000 Ford Owners  
Now Use

## The K-W Master Vibrator—WHY?

Because the Master Vibrator does a great deal more than simply replace the four separate vibrators on a coil. It is NOT A VIBRATOR in the ordinary sense, but a scientifically constructed MAGNETIC CIRCUIT BREAKER which times the spark more accurately than the ordinary High Tension Magneto. It is so designed as to utilize the alternating current of the Ford Magneto and make the coil produce a MUCH HOTTER SPARK than it could produce with any other vibrator.

No matter what coil you now have, whether it has four vibrators or one, THE K-W MASTER VIBRATOR will give you:—A HOTTER SPARK, preventing sooty plugs and carbonizing. MORE POWER. It makes the hills "Fade Away." EASY STARTING due to the hotter spark. INCREASED SATISFACTION with your car. LARGER CONTACT POINTS and handsome switch. EASILY PUT ON IN HALF AN HOUR, no changes in car necessary.

**OUR GUARANTEE**—If you even feel that you can get along without it, return it within 30 days,—money back and no questions asked.

PRICE—\$15.00. Express prepaid if cash accompanies the order. Order from us or through your dealer.

BE SURE TO GET



We are the originators and were the first to make and market a Master Vibrator. Insist on seeing the trade-mark and be protected in the original and only genuine time-tested and guaranteed Master Vibrator.

Write for Complete Catalog  
**THE K-W IGNITION CO.**  
2835 Chester Avenue CLEVELAND, OHIO, U.S.A.

# ZENITH

**Gives Standard Carburetion**

**ZENITH CARBURETOR CO.**  
DETROIT, MICH.

## Buffalo Electric

Direct Drive—Single Reduction  
Foot Control  
Irreversible Worm Steer  
Long Mileage Batteries  
Buffalo Service

Model 29 Roadster, . . .	\$2,600
Model 30 Coupe, . . .	\$2,200
Model 30-B Coupe, . . .	\$3,300

**The Buffalo Electric Vehicle Company**  
Buffalo, New York

## Mighty Michigan "40"

40-Horsepower Touring Car or Roadster, absolutely silent in operation. Oversize tires 35x4 3/4—cylinders 4 3/4 x 5 3/4 in.—118-in. wheel base—four-forward-speed transmission—demountable rims—nickel mountings—massive, straight-line body—big, roomy seats—electric lighting by generator—everything. Price \$1585, includes full equipment. Two smaller models. Catalog on request.



**MICHIGAN MOTOR CAR COMPANY**  
(130) KALAMAZOO, MICH.

## Marathon Automobiles

America's most comprehensive line. Every car completely equipped. 3 sizes chassis—10 body styles. Price range from \$875 to \$1800

Write for Catalogue M-A  
**MARATHON MOTOR WORKS, Nashville, Tenn.**

**ACCURACY — RELIABILITY — DURABILITY — ECONOMY**

are assured to the greatest extent in charging stations and other electric plants, by the use of the

# WESTON

SWITCHBOARD and PORTABLE

## INSTRUMENTS FOR ELECTRICAL MEASUREMENT

These instruments represent the greatest advance thus far in the art of electrical measurement

Full information is contained in catalogs, which will be sent upon request.

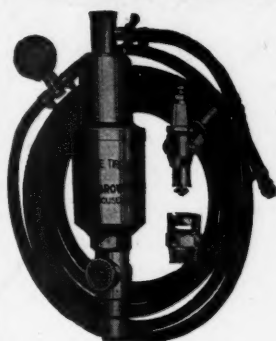
NEW YORK  
PHILADELPHIA  
CHICAGO  
BOSTON  
SAN FRANCISCO

ST. LOUIS  
DENVER  
CLEVELAND  
BIRMINGHAM

DETROIT  
PARIS  
BERLIN  
LONDON  
MONTREAL

TORONTO  
WINNIPEG  
VANCOUVER  
CALGARY

**WESTON ELECTRICAL INSTRUMENT CO.**  
Newark, New Jersey



PATENTED NOV. 5, 1912.  
Other Patents Pending.

## It's Easy to Use The Brown Impulse Tire Pump

Just give the spark plug, which is furnished with each pump, a quarter turn and lift out the core. Drop in the pump and give it a quarter turn. Start the motor at low speed. No wrench, no broken plugs. Your two hands do the trick in a jiffy.

One to four minutes and your tire is inflated with pure cool air. The gauge tells you when you have exactly the right pressure.

Enjoy your car this year. Don't sweat and fume with a hand pump. It's poor economy.

The Brown sells for \$15.00 complete. Pump, 12 feet of hose, self-opening valve connection, high-grade recording gauge and B'Co Spark Plug.

Present Brown Pumps made over to fit the new connection—\$2.00, including spark plug.

B'Co Quick Detachable Spark Plugs—require no wrench—\$1.50.

Ask your dealer or write us today for full information.

**THE BROWN CO., 1090 S. Clinton St., Syracuse, N. Y.**

### Be Prepared

to meet the demand we are creating for you on the

### NEW POSITIVE LOCK STOP TWITCHELL AIR GAUGE



"TIRE INSURANCE FOR \$1.00"

The best, simplest, most accurate, most durable and most easily read tire gauge on the market

**The Twitchell Gauge Co.**  
1201 Michigan Avenue Chicago, Illinois

See advertisement on back cover of this publication  
Jan. 16th and Feb. 13th



### SERIES "G" PLEASURE CARS

Option given of 60 H. P., 6 cylinder poppet valve motor or 60 H. P., 6 cylinder Speedwell Rotary-valve motor.

**4 and 5 passenger models, \$2850**

Fully Equipped

135 inch wheelbase, 34x4½ tires, electric starter, electric lighting and independent Bosch magneto ignition.

**SPEEDWELL MOTOR CAR COMPANY**  
20 ESSEX AVE., DAYTON, OHIO



## Braender Tires



are guaranteed for 4000 miles and live up to that guarantee. They are unexcelled for long mileage and endurance.

Send for price list and full particulars

Agents Wanted

**BRAENDER RUBBER & TIRE CO.**  
Main Office and Factory, RUTHERFORD, N. J.

Salesrooms: 1987 Broadway, N. Y. 1211 Bedford Ave., Brooklyn, N. Y.

## SCHRADER UNIVERSAL VALVES

Established 1844

Trade Mark Registered April 30, 1903

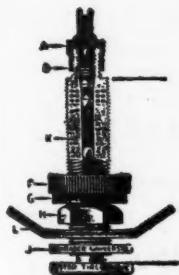
### SIMPLE AND ABSOLUTELY AIR TIGHT

Schrader Motor Valves, as shown in cut, are the regular equipment for G & J Motor Tires, Hartford Dunlop Clincher Motor Tires, Fisk Detachable Motor Tires and New Goodyear Detachable Motor Tires. Our No. 777 Motor Tire Valve is the standard for 2½-inch and 3-inch Motor Tires, and our No. 725 Motor Tire Valve is the standard for tires larger than 3-inch.

SUPPLIED TO THE TRADE BY ALL TIRE MANUFACTURERS

MANUFACTURED BY

**A. Schrader's Son, Inc.,** 28-30-32 Rose Street, New York



When Writing to Advertisers, Please Mention Motor Age.



## Guide



This Flush Type Dash Lamp has been adopted as standard 1913 equipment on some of the best cars.

The Semaphore lens gives wide distribution of light. The lamp is strong, the design is good.

Write for  
Guide Book No. 6

THE GUIDE  
MOTOR LAMP MFG. COMPANY  
East Fourth Street, Cleveland, Ohio

## Guide

## The Searchlight Gas Co.

1016 Karpen Building

Chicago, Illinois

Stronger than ever, legally, financially and in the esteem of the trade. Watch us grow.

### BRANCHES AND REFILLING STATIONS:

Warren, Ohio.	San Francisco, Calif.	Los Angeles, Calif.
Chicago, Ill.	Buffalo, N. Y.	New York City.
Detroit, Mich.	Atlanta, Ga.	Syracuse, N. Y.
Camden, N. J.	Dallas, Texas.	Minneapolis, Minn.
Philadelphia, Pa.	San Antonio, Texas.	Toronto, Canada.
Kansas City, Mo.	Boston, Mass.	Indianapolis, Ind.

## AUBURN 1913

"Rides Like a Pullman—Palls Like a Locomotive"

38 Years' Manufacturing Experience  
Built Into Every Model.

Model 33M—Two Passenger Roadster; 33 H.P. long stroke motor (3 1/2 x 5 1/4)—Price, \$1150.

Model 38L—Five Passenger Touring Car; 33 H.P. long stroke motor (3 1/2 x 5 1/4)—Price, \$1150.

Model 40 A—Two Passenger Roadster; 40 H.P. long stroke motor (4 1/2 x 5)—Price, \$1650.

Model Six—50—Six-Cylinder Touring Car, 50 H.P. long stroke motor (4 1/2 x 5 1/4)—Price, \$3000.

Model 40 L—Five Passenger Touring Car; 40 H.P. long stroke motor (4 1/2 x 5)—Price, \$1650.

Model Six—45 B—Two Passenger Roadster, 45 H.P. long stroke motor (3 1/2 x 5 1/4)—Price, \$2000.

Model Six—45—Five Passenger Touring Car, 45 H.P. long stroke motor (3 1/2 x 5 1/4)—Price, \$2000.

Send for 1913 Catalog

AUBURN AUTOMOBILE COMPANY, Auburn, Ind.

## Guaranteed Perfect Satisfaction or Money Refunded

Send \$2.00 for this standard size 8 inch

### Emergency Patch

Give it a thorough test, if not satisfactory in every respect return it to us and we will refund your money.

Jobbers Wanted

### 20TH CENTURY TIRE PROTECTOR COMPANY

Main Office and Factory, Midlothian, Texas

DALLAS OFFICE CHICAGO OFFICE  
Pacific and Olive Sts., Dallas, Tex. 1400 Michigan Ave., Chicago, Ill.

BEST  
GRADE—  
"CHROME  
VANADIUM"



NEXT  
BEST—  
"SPECIAL  
ANALYSIS"

### "THOSE EASY RIDING CLEVELAND-CANTON SPRINGS"

Both makers and purchasers of either personal or commercial cars will be interested to investigate, from our literature, why Cleveland-Canton Automobile Springs are so easy-riding, flexible, resilient, yet so strong and serviceable that under our rigid inspection and test system they will stand 40 tons pressure to the square inch without taking permanent set. Oil tempered—not merely oil flashed or water chilled.

Address for prices

THE CLEVELAND-CANTON SPRING COMPANY, CANTON, OHIO

## "IMPERIAL TWELVE"

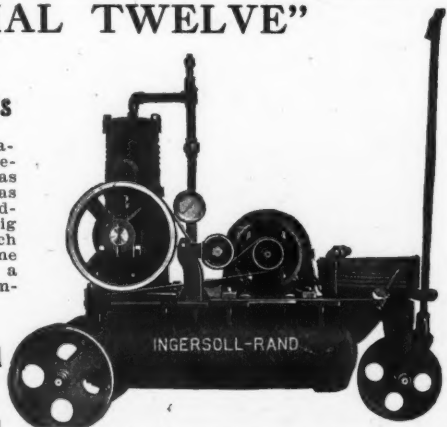
### Garage Compressors

These little machines are as carefully designed, as sturdily built, as thoroughly dependable, as the big compressors which have made the name "Ingersoll-Rand" a standard of compressor value.

Bulletin 3022

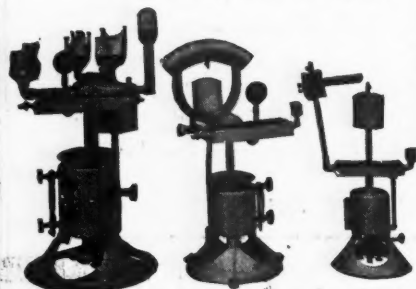
Ingersoll-Rand  
Company

New York London



## HAYWOOD STEAM VULCANIZERS

THE PROFIT MAKING PLANTS



The vulcanizing system that DOES NOT use air bags. SOLID PADS and HEAVY CLAMPS are the means through which pressure is generated.

Plants from  
\$25 to \$500

Write for Catalog B

Haywood Tire & Equipment Co., 524 N. Capitol, Indianapolis, Ind.



## We Ship On Approval

PREPAY FREIGHT AND ALLOW

### 30 Days Free Trial

The best "Nonskid" puncture-proof device on earth for automobiles and motorcycles.

### Try Them At Our Expense

Be your own judge—don't take anyone's word for it. "The proof of the pudding is in the eating."

IT ONLY COSTS ONE CENT to learn our unheard of prices and marvelous guarantee on Britson Detachable Treads.

Write Today for Full Particulars

The Britson Mfg. Co.

1213 Britson Building  
BROOKINGS, S. D.

# STANWELD RIMS

Made by the pioneers and masters of the craft. Mechanically perfect and built of the finest material procurable, they give the utmost in service and efficiency.

A type and size for every car and any tire

**THE STANDARD WELDING CO.**

CLEVELAND, OHIO

New York

Chicago

Detroit

## CLEAN-UP SALE Body Bargains!!

NEW Fore Door Bodies (5 passenger), 34 in. wide, 92 in. long and 61 in. from dash to end of rear door, cost to build in 100 lots, \$300;

Our Price.....\$100

We offer the public, while they last, these elegant bodies trimmed in the best quality of black leather, painted dark blue, at this immense reduction, because we purchased the entire plant of a well-known automobile manufacturer—\$100 Cash—F. O. B.—N. Y. City or Chicago.

**TIMES SQUARE AUTO COMPANY**

1708 to 1718 Broadway, 54th Street 1210 to 1212 Michigan Ave.  
NEW YORK CITY CHICAGO

Largest Dealers in the World in New and Used Cars and Accessories

## Boyer Suspension Bearings

Differ From All Others Because Each Ball Carries Its Share of the Load at All Times.

Boyer Suspension Bearings are—at one and the same time—true Radial and Thrust Bearings. They put an end to ball crushing, and have the least friction.

Write today for our booklet explaining the Suspension system of anti-friction bearings which are applicable for all purposes.

**The Suspension Roller Bearing Company**  
Sandusky, Ohio

"Pass Them All"



**Motor Cars**

Send for Pleasure or Commercial Catalogue.

**KNOX AUTO CO., SPRINGFIELD, MASS.**

## Get this book on tires-FREE

Gives a remedy for every tire emergency—is quoted as authority by foreign and American auto journals. Tells how to get 10,000 miles service and how the

# VULCANIZER

makes  
**ONE TIRE OUTWEAR THREE**

How it repairs any casing or tube anywhere. Electric vulcanizers for use on lighting current—steam vulcanizers if electricity is not available. The only vulcanizers that any one can use safely because of the exclusive feature, an automatic temperature control that protects the tire. C. A. SHALER COMPANY  
Send today for a copy of "Cars and Repair of Tires" while the edition lasts. 203 4th St., Waupun, Wis.

## PULLMAN

### The PALACE CAR of MOTORDOM

In offering the PULLMAN car to the motoring public, we have endeavored to supply a quality car at a moderate cost. Our line comprises the 4-36, 4-44 and 6-66 models, each one embodying all the PULLMAN features brought up to perfection by PULLMAN experience.

We have a wonderful agency proposition. Write today.

**PULLMAN MOTOR CAR CO. 238 N. YORK, PA.  
GEORGE ST.**

**The New Swinehart**

**KEATON NON-SKID TREAD TIRE** has four times the wearing service of the ordinary non-skid. Users will tell you that they have run Swinehart Keaton Non-Skid Tread Tires a whole season without having them lose their anti-skid effectiveness. Call at any one of our stores and investigate them. We also make a complete line of Smooth Pneumatic Tires of best quality. Branches and distributing agencies in all leading cities.  
**SWINEHART TIRE & RUBBER COMPANY**  
1206 North St., Akron, Ohio

# Stearns

**THE ULTIMATE CAR  
(KNIGHT-TYPE MOTOR)**

**4 The first American Car to adopt the Knight Type Motor — The Engine used by Daimler, Mercedes, Panhard and Minerva.**

**THE F. B. STEARNS CO.**

CLEVELAND, OHIO

Branches and Dealers in 125 Cities



## THE MAYER CARBURETOR

Gives the motor the right mixture at varying speeds, is the most economical, reducing gasoline expense a full 25 percent. And with the MAYER you can get from 15 to 30 percent more power from your motor than with 90 percent of the other carburetors on the market.

Write for catalogue No. 26E and learn the merits of the MAYER

**MAYER CARBURETOR COMPANY**

2673 Main Street, . . . Buffalo, N. Y.

## GOOD YEAR

AKRON, OHIO

This name on Automobile Tires and Rubber Accessories signifies inherent qualities of material and workmanship that insure the maximum of service at the minimum of expense. (673)

**THE GOODYEAR TIRE & RUBBER CO.**  
AKRON, OHIO



THE THOROUGHbred CAR

*Electric Self-kranking, Electrically Lighted  
Four Forward Speeds*

"Six Thirty-six" Touring Car and Roadster, \$1850  
Model 30 Touring Car..\$1350 Model 30 Roadster..\$1250

LIVE WIRE DEALERS  
WRITE FOR UNALLOTTED TERRITORY

**HERRESHOFF MOTOR COMPANY**  
Detroit, Michigan, U. S. A.

## Oakland

"The Car With A Conscience"

Write for 1913 Catalog

**Four and Six Cylinder Models**  
**\$1000 to \$3000**

**OAKLAND MOTOR CAR COMPANY**  
100 Oakland Boulevard Pontiac, Michigan

Hook up with **COLE**

## COLE

Series Eight comes in Three Chassis:

**Cole Sixty** six cylinder Touring Car, five passenger convertible to seven passenger, 132-inch wheel base, Delco electric lighting, starting and ignition. \$2485

**Cole Fifty** four cylinder Touring Car, five passenger convertible to seven, 122-inch wheel base, Delco system. \$1985

**Cole Forty** four cylinder Touring Car, five passenger, 116-inch wheel base, Delco system. \$1685

WRITE TODAY for Cole Blue Book and dealer's proposition.

COLE MOTOR CAR CO., Indianapolis, Ind.

Hook up with **COLE**

**SCHAFER BALL BEARINGS**  
MADE IN GERMANY SOLD IN AMERICA



When you buy SCHAFER BALL BEARINGS you are not experimenting because SCHAFER BALL BEARINGS have for years been recognized as the standard of bearing quality. They are made in Germany of the best steel, and are now in universal use throughout the world.

**BARTHEL DALY & MILLER**  
42 BROADWAY, NEW YORK

When Writing to Advertisers, Please Mention Motor Age.

## NEWTONE MOTOR HORNS

The longer a "Newtone" is used the better its warning powers are appreciated. We invite comparison



Torpedo Type

Torpedo Type  
Price \$20

Automobile Supply  
Mfg. Co.

220 Taaffe Place, Brooklyn, N. Y.

## KINGSTON CARBURETORS

Save Money by Economizing Gasoline

Five floating bronze ball valves opening automatically under different motor suction supply a uniform mixture at any speed, regardless of hot, cold, wet or dry weather.

Write for details and let us tell you why so many manufacturers are adopting this carburetor as standard equipment

Made by the oldest manufacturers of carburetors in America.

ESTABLISHED 1895

**BYRNE, KINGSTON & CO., Kokomo, Ind.**

# SPLITDORF

"Always There"

SPLITDORF MAGNETOS can always be depended upon to give your motor more power. They give the same efficient service winter and summer and never falter under any test.

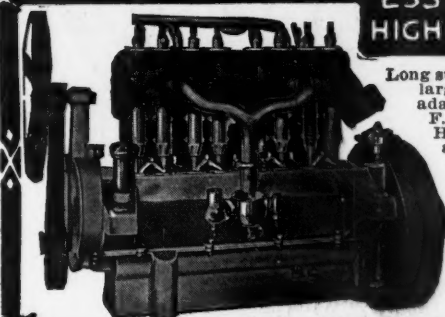
Write for new catalog

SPLITDORF ELECTRICAL CO.

98 Warren Street, Newark, N. J.

## The BRENNAN MOTOR

ESSENTIAL TO  
HIGH CLASS CARS



Long stroke, large bearings, large valves,  $4\frac{1}{2} \times 5$ , adapted for Regal, E. M. F., Warren, Autocar, Hudson and all standard makes of cars and trucks. We also furnish transmission gears. Two and four cylinder sizes, from 20 to 60 H.P.

Send for Catalogue "B"

BRENNAN  
MOTOR MFG. CO.  
Syracuse, N. Y.

## McFARLAN SIX

Electric  
Lighted

Self  
Starting

SERIES "S"—45 H. P., 2, 4 and 5 Pass.—\$2,300  
SERIES "T"—50 H. P., 2, 4 and 5 Pass.—\$2,500  
SERIES "M"—60 H. P., 2, 4, 5 and 7 Pass.—\$2,750

New Six Passenger, Coupe and Limousine  
Bodies slightly higher

TERRITORY OPEN FOR PROGRESSIVE DEALERS

Pioneer Six-Cylinder Car Builders of America

McFARLAN MOTOR CAR CO., Connersville, Ind.

# Red Head

REG. U.S. PAT. OFFICE

## MAGNETO PLUG

All Sizes  
All Styles  
Porcelain  
or Mica

**\$1.00**

EMIL GROSSMAN COMPANY  
Manufacturer  
250 WEST 64th ST.  
NEW YORK  
Detroit Branch and Factory  
844 Woodward Avenue

## WINTON SIX

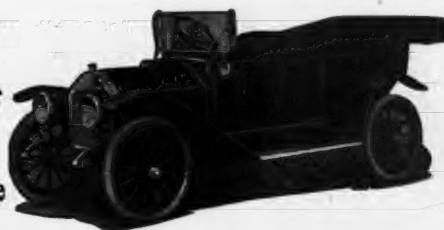
29.2 Cents Per 1000 Miles

The world's lowest repair expense record is held by the Winton Six. Records cover more than a million miles of travel in the service of individual owners. The complete story is told in our Upkeep Book. Let us send you a copy.

THE WINTON MOTOR CAR CO.,  
424 Bena Road, Cleveland, Ohio.

World's First Maker of Sixes Exclusively

Model "P"  
Five  
Passenger  
Touring  
Car  
Four-Cycle  
Four  
Cylinders  
 $4\frac{1}{2} \times 5\frac{1}{4}$   
inches



40 H. P.  
Long  
Stroke  
Motor  
Price  
\$1750.00  
Cylinders  
Cast in  
pairs  $\frac{1}{2}$   
inch offset

## ENGEL

"THE CAR OF VALUE"

Positive electric starter, electric lights all around and electric horn. Unit power plant, enclosed valves, three point suspension. Wheel base 120 inches, full floating rear axle,  $\frac{1}{4}$  elliptic rear springs, demountable rims with 8x4 tires, straight line bodies. Made in three models. Speedometer with grade indicator and eight-day clock with electric light—"Everything you need in a car."

New Catalog tells all about the Enger—"The Car of Value." It's of interest to both Dealers and Individuals. Write for it today.

THE ENGEL MOTOR CAR CO.,

2101 Gest Street, Cincinnati, O.

## Long Radiators

THE LATEST DEVELOPMENT  
IN

## High Grade Radiators

THE LONG MANUFACTURING CO.  
DETROIT, MICHIGAN

## THE RUTEMBER MOTOR

Is responsible for the success of a large majority of the most prominent pleasure and commercial cars. They will bear your investigation before the purchase of any type of car. Literature upon request.

RUTEMBER MOTOR CO., Marion, Indiana

Large photograph of the above cut for framing 14c in stamps.





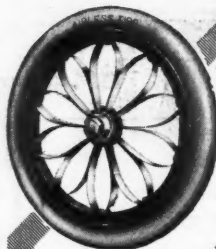
## THE SIX "48" KEETON Compares with the Best Foreign Cars

### THREE EXCELLENT MODELS

Riverside Touring Car, 5 passenger, Completely Equipped .....	\$2750
Two extra folding seats for above .....	\$25
Meadowbrook Roadster, Completely Equipped .....	\$2750
Tuxedo Coupe, Completely Equipped .....	\$3000
Chassis without tires or rear guards .....	\$2250

All Prices f. o. b. Factory.  
Booklet on Request.

Keeton Motor Company, Detroit, U. S. A.



## The Solution of the Tire Problem

for every motor driven vehicle, from electric coupe to five-ton truck, from touring car to motorcycle, is in the  
**Ideal Steel Wheel**

It eliminates the necessity of pneumatic tires. Ideal Steel Wheels equipped with solid tires, give greater riding ease with less wear on the engine and chassis than wooden wheels equipped with pneumatic tires.

Ideal Steel Wheels double the life of any tire and when used with pneumatic tires make your car ride like a cradle over the roughest kind of roads. No repair bills for punctures or blow outs. No stops to put on new tires or repair the old.

Built for every type and size of cars. Write for literature today.  
Ideal Steel Wheel Co. 1069 First Nat'l Bank Bldg., Cincinnati, O.



The Emblem of Efficiency

For Actual Service **CHASE TRUCKS** Give Constant Satisfaction

SIX MODELS 500 TO 4000 POUNDS CAPACITY  
ALL STYLES OF BODIES

Up to two tons capacity the Chase line is the most complete and varied shown anywhere.

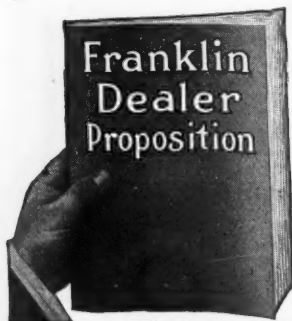
For catalogue and further information, address

**CHASE MOTOR TRUCK COMPANY**  
332 S. West Street, Syracuse, N. Y.



ROYALTY PROPOSITION TO AUTO.  
MOBILE OR TOP MANUFACTURERS ON REQUEST  
**JIFFY AUTO CURTAIN COMPANY**  
513 Ford Bldg., Detroit, Mich.

## Write For This Franklin Dealer Proposition



**F**RANKLIN six-cylinder models now equipped with Entz Electric Starting and Lighting. A real self starter with original features. Franklin cars use less gasoline, less oil, no smoke, fewer tires, travels faster, rides easier, silent, powerful, flexible, beautiful. Get the Proposition.

Franklin Automobile Co., 27 Franklin Sq., Syracuse, N. Y.

CONNECTICUT

## Shock Absorbers



SECTIONAL VIEW

"Make Every Car  
a Parlor Car"

Send for Catalog No. 28

**CONNECTICUT SHOCK  
ABSORBER CO., INC.**  
Meriden, Conn.



**Dealers - I have a  
Very Special Proposition  
To Offer You for 1913  
Harry B. Staver**

Write at once for full particulars of my  
unique 1913 Dealer's Proposition.

**STAVAR** (108)

The 1913 Staver is a genuine revelation—our 1913 Dealer's Proposition is worthy of this wonderful car. Get the whole story—write now.

**STAVAR CARRIAGE CO.**  
76TH & Wallace Sts., Chicago





Croxton cars incorporate all of the features for which the buyer looks in the new models.

Write for catalog and Agency details.

**THE CROXTON  
MOTOR CAR CO.**  
WASHINGTON PA.



## Elyria-Dean

### ELECTRICAL APPARATUS OF QUALITY

TUTO HORNS  
REXO HORNS  
TALLY-HO HORNS  
SPEEDOMETER

ELYRIA-DEAN  
IGNITION SYSTEM  
ELYRIA-DEAN STARTING AND  
LIGHTING SYSTEM

Manufactured only by

### THE DEAN ELECTRIC COMPANY

504 Olive Street

ELYRIA, OHIO, U. S. A.

"Look for Elyria-Dean where Quality's seen"

Is There a

## PAIGE

### Dealer In Your Territory?

If not, write or wire us today. The Paige "36" at \$1275 and the Paige "25" at \$950 are the leaders in the popular price field. You want them, if you can get them.

### PAIGE-DETROIT MOTOR CAR CO.

304 Twenty-First Street, DETROIT, MICHIGAN



### This TIRE-DOH Outfit Will Save 9/10 of Your Tire Repair Expense. \$2.00.

Sent anywhere express prepaid upon receipt of \$2. Money back if you ask it. We guarantee that with a Tire-Doh Outfit you can permanently repair every injury that can happen to a tube or casing absolutely without vulcanizing and at one-tenth its cost. You can repair punctures, blow-outs, cuts—in both tube and casing—15 minutes for a puncture, an hour for a blowout. Don't confuse this genuine Tire-Doh Outfit with the many worthless imitations, packed like our outfit and offered by unscrupulous dealers trading on our reputation. There is only one Tire-Doh Outfit. It comes in a white enameled can.

(like cut). The name is our registered trademark. Get the genuine guaranteed article direct from us, if your dealer won't supply you. Sent anywhere express prepaid upon receipt of \$2.

ATLAS AUTO SUPPLY CO., 73 E. ADAMS ST., CHICAGO, ILL.

## ★ STAR BALL RETAINERS ★

STAR BALL RETAINERS are famous wherever ball bearings are known. The best bearing service attends the car equipped with STAR BALL RETAINERS. We also manufacture more thrust bearings than any concern on the market. Send us your requirements.

THE STAR BALL RETAINER CO.  
LANCASTER, PA.



## I Want You to HEAR This Musical Auto Horn

I know there isn't anybody who can describe the chime-like signal of the Aermore Horn to you. So I want you to hear it—

### The AERMORE Exhaust Horn

—the horn harmonious

I want you to write me and I'll tell you where and how you can hear the singing, organ-like tones of the Aermore. Just drop me a postal.

G. V. P. Lansing, President.

Patented  
Jan. 23, '12  
Aug. 20, '12

AERMORE MANUFACTURING COMPANY  
Dept. 5578, 1536 Michigan Blvd. CHICAGO, U. S. A.



### The man who knows a car

likes the sturdy STUTZ. It's a car after his own heart, because it embodies nothing but the best principles of construction. Write today for advance Booklet A-2, Sturdy STUTZ Announcement, Series B.

### IDEAL MOTOR CAR CO.

Manufacturers of Stutz Cars  
Indianapolis  
Indiana

## The Chicago Electric

A beautiful and classic equipage that stands unchallenged in point of constructional achievement

### Chicago Electric Motor Car Co.

3612-18 South Morgan Street

Chicago

### Motor Car Manufacturers Since 1893

## HAYNES

1912

Occupying the newest and most modern automobile manufacturing plant in America.

HAYNES AUTOMOBILE CO., Dept. T-3, Kokomo, Ind.



## Rudge Whitworth Detachable Wire Wheels

.....fitted with.....

## Houk (Quick Detachable) Rims

*Guaranteed the Best in the World*

**Geo. W. Houk Company**  
5002 Lancaster Avenue Philadelphia, Pa.

## LIGHT OR WATER

We supply you with the one and save you the other. Ham's Truck and Pleasure Car Lamps are America's very best.

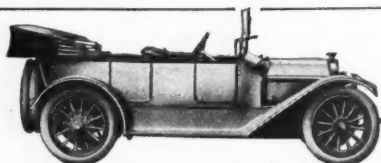


Our "Ideal" Carriage Washers and Automatic Water Savers save the water.

*Ask Us About Them*

**C. T. HAM MFG. COMPANY**  
Rochester, N. Y.

TYPE 35  
SERIES  
G AND H



ELECTRIC  
STARTING  
AND  
LIGHTING

## MERCER THE CHAMPION LIGHT CAR

Type 35—Series G—4-Passenger  
Type 35—Series H—5-Passenger  
Type 35—Series J—Raceabout  
Type 35—Series K—Runabout

Prices: \$2600 to \$2900

MERCER AUTOMOBILE COMPANY, 800 WHITEHEAD ROAD, TRENTON, NEW JERSEY

## CARTERCAR



Has an unlimited number of speeds—with one lever control. No gears. Will climb a 50% grade. Simple, reliable—and more efficient than is possible for a gear driven car. Five splendid models, \$1200 to \$2100. Write today.

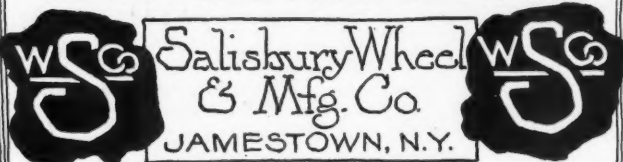
**CARTERCAR COMPANY**

Pontiac, Michigan

Branches: New York, Chicago, Detroit, Kansas City

## SALISBURY

### AXLES WHEELS TRANSMISSIONS



JAMESTOWN, N. Y.

*The Brake Lining  
of QUALITY*

### MULTIBESTOS

Safest—Surest—Best Wearing.

Economical for Users  
Profitable for Jobbers

*Adopt It At Once*

Write for Book, "Safe Within the Grip of Multibestos."

STANDARD WOVEN FABRIC CO.  
WORCESTER, MASS.

Chicago, 1430 Michigan Blvd.  
Detroit, 1598 Woodward Ave.  
Philadelphia, 1427 Vine St.  
San Francisco, Fred Ward & Son



## Great Western

FORTY  
1913 FULLY \$1585  
EQUIPPED

LUXURY — POWER  
ABSOLUTE SILENCE

WRITE FOR OUR NEW CATALOGUE  
GREAT WESTERN AUTOMOBILE CO.  
DEPT. 20 PERU, IND.

## GRAY & DAVIS



## LIGHTING DYNAMO SYSTEM

Lights your lamps (without battery connection), charges your batteries, operates power-horn, inspection lamp, etc. A complete system—not a makeshift.

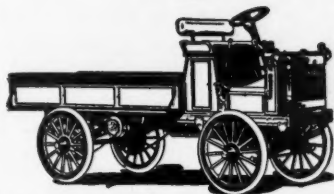
### Gray & Davis Products

Are supplanting oil and gas lamps wherever automobiles are used. Gray & Davis 6 Volt Electric Starter, Electric Lamps and Dynamo are Standard Equipment on America's leading cars.

**GRAY & DAVIS, Inc., 55 Lansdowne St., Boston, Mass.**

Manufacturers of Automobile Lamps, Dynamos  
and Electric Starters

# Sanford



## The Truck Built by Truck Specialists

A high grade, dependable one-ton truck. Accessible, simplified and built to give service that is bound to satisfy the user.

Four cylinder, water cooled unit power plant, 3-point suspension, clutch and fly wheel in oil tight housing. Lastingly good, therefore permanent.

ly popular. This is a truck for which live dealers will find a ready sale. Write for the terms.

**THE SANFORD MOTOR TRUCK CO.**  
1814 Park Street Syracuse, N. Y.



## Transmissions

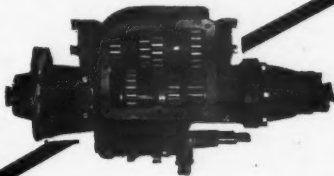
made by Specialists

COVERT TRANSMISSIONS GIVE perfect service, because they are designed and built by men thoroughly acquainted with every requirement that is made by a motor car transmission.

For Commercial Vehicles of from 500 to 10,000 lbs. capacity.

For Pleasure Cars of from 20 to 60 H. P.

**Covert Motor Vehicle Co.**  
Sales Office—Detroit, Mich.  
Factory—Lockport, N. Y.

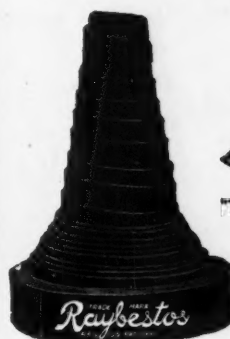


## YOUR BRAKES GRIP

When Lined With

TRADE MARK  
**Raybestos**  
REG. U.S. PAT. OFF.

"THE ORIGINAL AND BEST ASBESTOS BRAKE LINING"



**The Royal Equipment Co.**

438 Housatonic Ave., New York

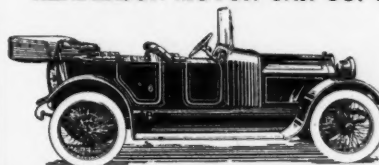
We also make Duplex and Raymond Brakes and Gyrex, the Mixer

## Henderson Luxury Car

Forget the price—just consider what the Type 47 Henderson offers: Wire wheels, left hand drive, dynamo electric lights, single lever center control, long stroke motor, Stutz rear axle, 3 point suspension, complete equipment, etc. Send for complete catalog. A Henderson agency is a money maker in open territory.

WRITE FOR TERMS TODAY

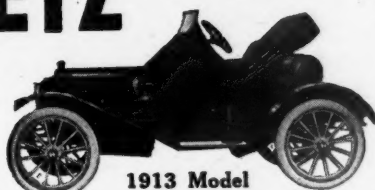
HENDERSON MOTOR CAR CO. of Indianapolis, U. S. A.



**\$1585**

Type 47, Five Passenger  
Completely Equipped  
Wire Wheels  
One Extra Wheel

**METZ "SPECIAL" \$395**



1913 Model

COMPLETELY  
EQUIPPED

LEFT-HAND DRIVE  
CENTER CONTROL

22½ H. P., 4-cylinder water-cooled motor, Bosch magneto, standard artillery wheels, best quality 30"x8" clincher tires, extension top, wind shield, five lamps, gas generator, tools, etc. Makes 5 to 60 miles per hour on the high speed, 28 to 32 miles on 1 gal. of gasoline. A thoroughly practical, fully guaranteed car. You can secure EXCLUSIVE SALE in your territory.

Send for Book "K."

**METZ COMPANY, Waltham, Mass., U. S. A.**

## SALESMANSHIP IS A NECESSARY EVIL

The less the buyer wants your goods, the more you've got to use of that costly stuff. The way out is—sell what the Buyer wants. In the motor field that is the



**BUDA**  
MOTOR



We're 25 years old now and you can rest assured there will never be any "out of business" sign up when you want that interchangeable part.



Model "T"

Special arrangement for "get-at-ability"; also a Special Oiling device—best yet.

All the details to you if you write to

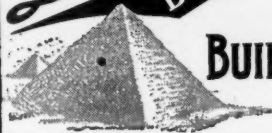
**BRANDENBURG & CO.**

1108 S. MICHIGAN AVE.  
CHICAGO.

57TH AND BROADWAY  
NEW YORK CITY.

FORD BUILDING  
DETROIT.

**Dorris**  
Built to last



**THE SILENT CAR**

**BUILT TO LAST**

Our agency proposition will interest you. Write for it.

**DORRIS MOTOR CAR COMPANY**

100 S. Sarah Street

St. Louis, Mo.

# Corcoran Lamps

GAS, OIL, AND ELECTRIC

CORCORAN LAMP CO.  
CINCINNATI



# Baker Electrics

## Pleasure Cars Trucks

Each carries the strongest and most significant guarantee ever placed upon a car of any make or type—the guarantee of Baker design, Baker material, Baker construction, Baker workmanship, Baker reputation.

Communications from Open Territory Solicited

THE BAKER MOTOR-VEHICLE COMPANY - - Cleveland, O.

# Studebaker

"25"—Five Passenger.....\$ 885  
"35"—Six Passenger.....\$1290  
"Six"—Six Passenger.....\$1550

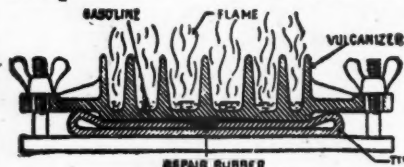
Nineteen thirteen will be a Studebaker year. Studebaker dealers will do the biggest business in their experience and their profits will be proportionately great. Studebaker cars represent the greatest values ever produced at the price.

The Studebaker Corporation - Detroit, Mich.

## Inner Tubes Easily Repaired in 15 Minutes

Do it yourself anywhere, and save time and money, with the

## Imperial Vulcanizer Repair Kit



Place tube between plates of vulcanizer (see cut); tighten thumb-screws; put a little gasoline in pronged receptacle; ignite. Operation simple. Repair permanent.

Guaranteed to Satisfy or Money Refunded

McGraw Tire & Rubber Co., Dept. C, East Palestine, O.

PRICE \$3.50

NICKEL PLATED  
Patent Pending

Complete with enough rubber for 40 punctures. At your dealer's or sent by express.

# KISSELKAR TRUCKS

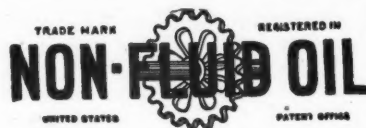
Complete line of commercial vehicles—all type bodies—special bodies designed. Reserve power, low fuel cost—sizes to give economical service under any conditions.

1500 lb., 1, 2500 lb., 2, 3, 4, 5 ton trucks.

KisselKar Service keeps down operating costs. Write for big special truck catalog illustrating many models.

Kissel Motor Car Co., 121 Kissel Ave., Hartford, Wis.

Don't mix oil and grease in your transmission. USE



It has just the right consistency.

New York & New Jersey Lubricant Co., N. Y.

## Safety and Power

Both are embodied in the highest degree in the



## The Car of Absolute Exclusiveness

1913 Models made in six bodies, three lengths chassis, two sizes motor, electric starter, lights, horn and generator ignition. Prices \$2750 to \$3750.00. Write for literature.

THE NORWALK MOTOR CAR COMPANY  
1014 Winchester Ave. Martinsburg, W. Va.

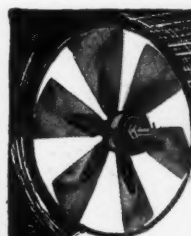
## Myers' Automobile Tops

Beautiful classy tops for large or small cars. Ready made sizes in stock for almost any make of car.

Made of the best materials by skilled workmen. They outlast all others and look better. We have over 1000 happy users of the model shown in this ad. It is a beautiful, attractive top. Built for Runabout use, and is distinguished by the absence of the front bow, which frequently knocks your hat in the mud.

Let us send you the most comprehensive automobiles top catalog in the world.

MYERS' AUTOMOBILE  
TOP COMPANY  
DAYTON - OHIO

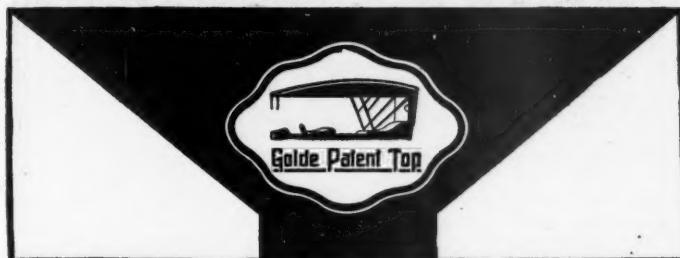


Manufacturers Don't omit  
of 1913 Models: a SPARKS-  
WITHINGTON

Fan from your 1913 specifications. Our One-Piece blade, ball-bearing, radiator fan assemblies cool the motors of more high-class cars than any other fan on the market. There's a reason. SPARKS-WITHINGTON Fans deliver the greatest volume of air with the least H. P. consumption of any fan obtainable. Furthermore, their one-piece construction is positive insurance against blades which loosen, become detached and fly off. Undoubtedly one of our ten standard models is just what you have been looking for. Catalogue and detailed blue-prints on request. Get in touch with us.

The Sparks-Withington Co.  
JACKSON MICHIGAN - WALKERVILLE CAN.

# THE ONE-MAN TOP



CAN BE HANDLED BY ONE PERSON AS EASILY & QUICKLY AS AN UMBRELLA  
INSTANTANEOUS PROTECTION  
GOLDE-PATENT MANUFACTURING CO. 531 W. 56th ST. NEW YORK.

## LAUTH-JUERGENS

One, Two, Three and  
=Five Ton Trucks=

"Guaranteed for Life"  
"Guaranteed Service"

The Lauth-Juergens Motor  
Car Company, Fremont, Ohio

"OLYMPIC" \$1800  
4 cylinders  
"MAJESTIC" \$1975  
4 cylinders  
"SULTANIC" \$2600  
6 cylinders

**JACKSON**  
AUTOMOBILE CO.  
1207 EAST MAIN STREET,  
JACKSON, MICHIGAN.

*Jackson*

NO HILL TOO STEEP  
NO SAND TOO DEEP

**Stewart**  
**Piston Gasoline**  
**Saver—\$6.50**

Saves up to 40%

20% guaranteed or money refunded  
ON MARKET THREE YEARS  
Agencies in most all cities and towns

**HALLIWELL CO.,** 406 WEST FIDCO STREET,  
LOS ANGELES, CALIF.

## The *Pilot* "THE CAR AHEAD"

Three Great Models: Pilot 40—Four cylinders, 4½x5; brake test; 55 horse-power; 120" wheel base; price, \$2000. Pilot 50—Four cylinders, 4½x6; brake test, 59 horse-power; 126" wheel base; price, \$2250. Pilot 60—Six cylinders, 4x6; brake test, 67 horse-power; 132" wheel base; price, \$2500.

### The Car Without a Mechanical Defect

Teetor "T" head motors, full floating rear axles, Brown-Lipe differential, Warner transmission, Elsemann magneto, Stromberg carburetor, handsome jewel bodies with ventilating windshield. Completely equipped, with every convenience and comfort. Dynamo electric lighting and electric starter (Gray & Davis system), power tire pump. We have the greatest agency proposition in the United States.

Write for our beautiful art book showing cars in detail

PILOT CAR SALES COMPANY, Richmond, Indiana

Look At Our New Middle Name

## PENNSYLVANIA *Oilproof* VACUUM CUP TIRES

Pennsylvania Rubber Company  
JEANNETTE, PA.

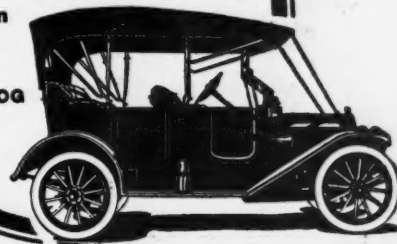
Branches—Coast to Coast

## HOLD YOUR BREATH

GET OUR 1913 AGENCY PROPOSITION  
WRITE US THIS MINUTE  
IT'S ALL VELVET FOR YOU  
**W. H. MCINTYRE CO.**

Auburn  
Ind.

CATALOG  
R



**GET Acquainted WITH EAGLEINE NO-KARBON OIL**

EAGLEINE NO-KARBON OIL possesses less than one-half the carbon and other impurities contained in all other cylinder oils. It's a lubricating wonder. Its use means a clean motor.

**EAGLE OIL & SUPPLY CO.**  
104 BROAD ST., BOSTON.  
114 W 57th ST., CHICAGO, ILL.



IT'LL TAKE A DERRICK TO  
STEAL THE CAR LOCKED  
WITH

## GASOLOCK

Why not please and also protect your trade?  
Every dealer who sells his buyer a Gasolock gives him  
an Insurance Policy against Theft and Joy Ride wrecks.  
This is distinctly a proposition for Dealers—the kind  
who want to hold their trade—and get more.  
Our device is Right—and what is more, it's a Seller.  
Write us today, asking us what we do for Dealers.

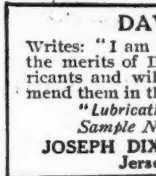
AUTO LOCK & SPECIALTY COMPANY  
414 Scherer Building, Detroit, Mich.



### TEDDY TETZLAFF

Writes that he "would rather pay \$5.00  
per pound for Dixon's Automobile  
Lubricants than use any other as a  
gift."

"Lubricating The Motor" and  
Sample No. 82-G on request.  
JOSEPH DIXON CRUCIBLE CO.  
Jersey City, N. J.



### DAVE LEWIS

Writes: "I am thoroughly convinced of  
the merits of Dixon's Automobile Lub-  
ricants and will both use and recom-  
mend them in the future."

"Lubricating The Motor" and  
Sample No. 82-G on request.  
JOSEPH DIXON CRUCIBLE CO.  
Jersey City, N. J.



## MOTOR TRUCKS

### THREE EXCEPTIONAL MODELS:

Model ED—1,000 lbs. capacity (2 cyl.)	\$ 750
Model B—1,000 to 2,000 lbs. capacity (4 cyl.)	1,100
Model C—2,000 to 3,000 lbs. capacity (4 cyl.)	1,775

Write us for full information and  
liberal specifications.

THE DART MOTOR MANUFACTURING CO.  
WATERLOO, IOWA (18)

### SEE

The **Inter-State** cars

at

Chicago Show—Feb. 1st-8th, 1913  
Space Q3 Coliseum Annex

Boston Show—Mar. 8th-15th, 1913  
Space 135 and 141 Main Floor

**Inter-State Automobile Co.**

2712 First Street  
Muncie, Ind.

## Reo the Fifth

Final and crowning achievement of R. E.  
Olds, pioneer designer of autos. A standard  
size 30 to 35 horsepower four-cylinder car  
of modern refinements priced at only \$1095.

R. M. OWEN & CO., General Sales Agents  
REO MOTOR CAR CO., LANSING, MICH.

You  
Can  
Walk  
From  
There  
to  
Any-  
where.

## THE WOODSTOCK

The Hotel  
of Comfort

43rd St., Just East of Broadway, New York



Our new addition is ready  
for occupancy. We now  
have 360 rooms with 265  
baths. Write us for de-  
scriptive folder with typ-  
ical floor plan and rate  
card. Wire for reserva-  
tion at our expense.

### Rates

From \$2.50 to \$4.00 Per Day

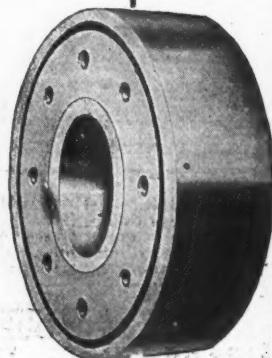
**W. H. VALIQUETTE**

MANAGER

Also The Berwick, Rutland, Vt.

"Hyatt  
Quiet  
Bearings"

Hyatt Roller Bearing Co.  
Detroit, Mich.



**Schacht**

THE CAR  
THAT CAPTURED FIFTH  
PLACE AT INDIANAPOLIS, MAY 30TH

Here is Model "NS"—Electric Starter, Elec-  
tric head lights, side lights and tail lamp operated  
with generator and storage battery, 36 x 4 de-  
mountable rims with one extra rim, folding zig-  
zag wind shield, trip speedometer, aluminum ad-  
justable ventilator in windshield base, robe rail,  
fuel rail, tire iron, horn, pump,  
all tools, jack and tire repair  
outfit. Price \$1850. Send  
for dealers' proposition.

THE SCHACHT MOTOR  
CAR COMPANY  
2921 Spring Grove  
Avenue  
CINCINNATI, OHIO

**\$1850**

When Writing to Advertisers, Please Mention Motor Age.

## B. A. Gramm's Motor Trucks

Newest Designs; Latest Improvements; Built in every detail to insure satisfactory and permanent results.

Write for photographs, descriptive literature and the exceptional values we offer you—far beyond all others.

**The Gramm-Bernstein Co.**

Exclusive Motor Truck Builders

Lima, Ohio, U. S. A.

**SKID BLOWOUTS RIMCUTS PUNCTURES WEARING OFF OF RUBBER NOT**

Each section 2 in. wide. They hook to rims. Try two or three sections over any old blowout. Special prices to the first in new territory

**KIMBALL TIRE CASE CO., 173 B.W.D., COUNCIL BLUFFS, IA.**

## Stevens-Duryea

Motor Cars

*Pioneer Builders of American Sixes*

**STEVENS-DURYEA COMPANY**

CHICOPEE FALLS, MASS.

Catalog on request.

## AJAX

EXTRA HEAVY

### NON-SKID TIRES

*The Only Non-Skid Tires  
Guaranteed for 5000 Miles*

**AJAX-GRIEB RUBBER CO.**

General Offices: 1796 Broadway, New York City

Factories: Trenton, N. J.

Branches in Principal Cities

## ZERO-40

**THE IDEAL RADIATOR FLUID  
A Natural Mineral Water. Guaranteed  
Not to Freeze at 40 Below Zero**

As harmless to metals and rubber as ordinary water. Evaporation is replaced with ordinary water, but leakage must be replaced with Zero-40.

**ZERO-40** in your car removes the possibility of damage either by frost or corrosion.

We will send under the above guarantee a five-gallon can of Zero-40 to any address in the United States, charges prepaid, on receipt of five dollars.

**DEALERS**—Write to us for the address of our nearest distributor who is under contract to supply you in any quantity.

**AUTOMOBILE EQUIPMENT COMPANY**  
Dept. 2 225 East Jefferson Avenue, Detroit, Mich.

## Hupmobile

**Hupmobile "32" Touring Car, Fully Equipped, \$975, F. O. B. Detroit**  
Long stroke motor, 84x5 1/2".  
Enclosed valves.  
8 bearing crank shaft.  
Unit power plant.  
Multiple disc clutch.  
Three speeds forward.  
Sliding gears.  
Full floating axle.  
Center control.  
Zenith carburetor.  
Hoch Magneto.  
106-inch wheelbase.  
32x3 1/2" tires.  
Quick detachable rims.  
Mohair top with envelope.  
Riffy curtains.  
Magneto and camshaft driven by silent

**Hupmobile "32" Roadster, Fully Equipped, \$975, F. O. B. Detroit**  
Chassis and specifications same as Touring Car. Large turtle back dust-proof compartment for extra accessories, tires and baggage.

**Hupmobile "32" Delivery, Fully Equipped, \$950, F. O. B. Detroit**  
Chassis same as Touring Car.  
Carrying capacity, 800 lb.  
Chassis & body painted black, high-class finish.  
Enclosed panel body.  
Two-cushioned Lacy-back seats.  
Gas headlights.  
Oil side and tail lamps.  
Quick detachable rims.  
Tools—horn.  
Frim's, black & nickel

**HUPP MOTOR CAR COMPANY, 1228 Milwaukee Ave., Detroit, Mich.**

## GO TO BLAZES



with one of our effective Fire Extinguishers and observe the Opposition it Raises against further fire destruction. Invaluable for every car, garage or factory. Chemicals used act instantly and will not injure self or car.

**List \$1.00 Each** **Deniers Write for SPECIAL PRICES**

**THE MOTOR CAR EQUIPMENT CO.**

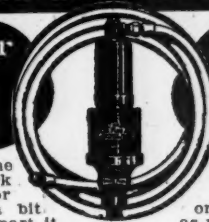
Manufacturers Importers Wholesalers

Department  
55 Warren-St., N. Y. City

Uptown Branch  
233-240 West 56th St.

## SPARK PLUG PUMP

Lets the Motor  
fill the  
Tires



Adaptable to  
All Makes  
of Cars

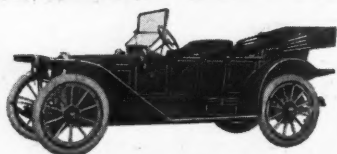
Simply substitute the pump for any spark plug, let your motor run, and without a bit of exertion on your part it will fill your tires with cool, pure air. It weighs but 2 1/2 pounds and can be conveniently carried

under the seat. So simply constructed it cannot get out of order. It will last as long as your motor. Adapted to any car. To be had at one-half the cost of high-priced complicated pumps.

**Price, Complete, \$10.00**

Take advantage of our trial offer and give it a chance to make good on your car.  
**MAYO MANUFACTURING CO., 55 East 18th Street, Chicago, Ill.**





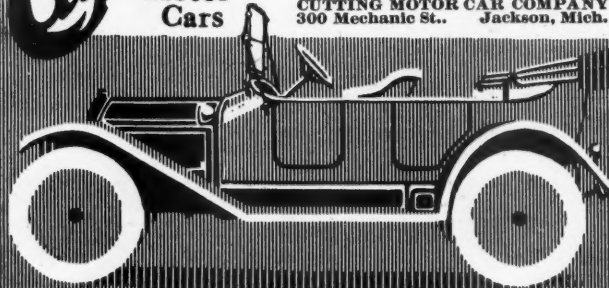
## AMERICAN UNDERSLUNG

WE have published a very interesting book on the advantages of Underslung construction. It is of value to dealer or individual. It tells of our full line which ranges in price from \$1475 to \$4500. Write for a copy today.

**American Motors Company**  
Dept. H Indianapolis, Indiana

*Cutting*  
Motor  
Cars

6-60 Six-Cylinder Touring Car  
fully equipped, including  
electric starter and lights. \$2750  
Five-passenger Touring Car. \$1475  
Two-passenger Roadster .... \$1475  
The same chassis is used for both models.  
Wide-a-woke dealers write for dealers'  
proposition  
**CUTTING MOTOR CAR COMPANY**  
300 Mechanic St., Jackson, Mich.



# EISEMANN

### Has Always Led

Ask us to tell you about the wonderful new pole pieces and the Automatic Control Magneto

### THE EISEMANN MAGNETO COMPANY

Indianapolis, Ind. New York Detroit, Mich.  
514 N. Capitol Ave. General and Sales Office 802 Woodward Ave.  
225-227 West 57th St.

## HOFFECKER-WALTHAM

Speedometer 8 Day Timepiece

These famous instruments represent the highest development of accuracy and dependability in automobile equipment.

Hoffecker Speedometers and Waltham 8-Day Timepieces have been invariably selected by car owners who demand the best the world affords. Illustrated literature sent free by

**The HOFFECKER CO. WALTHAM WATCH CO.**  
Boston, Mass. Waltham, Mass.

## ANNULAR BALL BEARINGS

The Dependable-Kind

# F & S

Made in Germany

## J.S. BRETZ COMPANY

Sole Importers

MOTOR HALL, 250 West 54th St., NEW YORK



## "Firestone" Tires and Rims



are the least likely to require changing, and afford the best means of tire changing when required.

**The Firestone Tire & Rubber Co., Akron, Ohio**  
and All Principal Cities

### THE SELDEN CAR

Is a high grade, efficient car built for comfort and durability. It is a finished car even to the smallest detail. Its equipment includes everything that could be desired in even the highest priced car — self-starter, electric lighting system, top, speedometer, wind shield, demountable rims, etc.

FIVE MODELS	{	2, 4 and 5 Passenger	\$2350
		7 Passenger	2500
		Limousine	3750

### SELDEN MOTOR VEHICLE COMPANY

Write for Catalog

ROCHESTER, N. Y.

## Rushmore Electric Car Lighting

**SMALLEST DYNAMO**—largest output. Headlights up to 30 c. p. supplied without daylight charging. No delicate regulating mechanism. Simplest—most reliable—cheapest.

Full technical description on request.  
No. 1 dynamo, diameter 5 1/4 inches, length 8 inches.  
**RUSHMORE DYNAMO WORKS, Plainfield, N. J.**

# The AMES

SHOCK ABSORBER is the most logical device of its kind, because it relieves the springs of all shocks, saves them from unnecessary wear and guarantees smooth riding by "eating up" all jolts.

The AMES SHOCK ABSORBER consists of a steel spacing block and an inverted steel spring, applied to the spring of the car. Easily adjusted. Always on the job.



Write for prices

**Clarence N. Peacock & Company**  
(Exclusive Licensees) 1784 B'way, N. Y. City

*Imperial*



## INVESTIGATE

These Five Great Cars NOW

Imperial Offers Unusual Values for 1913

MODEL 32.....\$1285	MODEL 33.....\$1285
MODEL 34.....\$1650	MODEL 44.....\$1875
MODEL "SIX"—60.....\$2500	

Supreme in Beauty and in Constructional Merits

Imperial Automobile Co., Jackson, Mich.

## The Kinsey Manufacturing Company, Toledo, Ohio

### MANUFACTURERS OF AUTO PARTS

KINWOOD RADIATORS, FENDERS,  
KINWOOD OILERS, GASKETS,  
KINWOOD STEEL FRAMES,  
ETC., ETC.

### SPECIAL METAL STAMPINGS

# WIRE MACHINE WHEELS

Save Tires—Save Fuel—Save Car. Make cars easier riding and easier driving. Stronger than any other practical wheel.

**THE McCUE CO.,** Buffalo, N. Y.



We have had to double our gigantic output—and the demand is more than doubling. Nearly 180,000 have been sold and delivered. New prices \$525 to \$800. Dealers everywhere. Ford Motor Company, Detroit, Michigan.

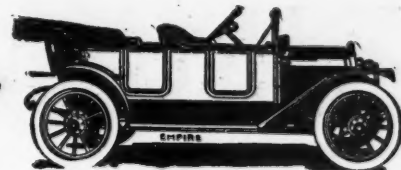
## INVADER MOTOR OIL



Is not the lowest priced oil on the market, but is supreme in quality. Will reduce your engine repair bills, give you 100% lubrication and full engine efficiency. Ask the opinion of any expert. *If your dealer hasn't it, write*

**CHARLES F. KELLUM & Co.**  
PHILADELPHIA BOSTON

Excelsior Genl. Supplies Co., CHICAGO, Distributors for Middle West



## EMPIRE

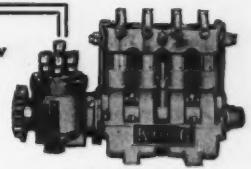
"The Little Aristocrat"

The Completely Equipped Empire five-passenger touring car for \$950—Equipment includes Mohair Top and envelope, Windshield, Prest-O-Lite tank and Speedometer.

THE EMPIRE AUTOMOBILE CO., Indianapolis, U.S.A.

The Hit of the New York Show

Self Starting  
**Kellogg**  
Tire Pumping



Patent Pending

Sets motors humming that no other starter can move and inflates tires to any desired pressure in less than three minutes. Adds less than 40 pounds to any car, and costs from \$75 to \$150 less than any other good starter. Can be attached to any car that has an exposed driving shaft.

Ask any good dealer or write

**KELLOGG MFG. CO.,** 13 Circle St., Rochester, N. Y.  
Chicago New York San Francisco  
1108 Michigan Avenue 1733 Broadway 444 Market Street



## WHERE'S YOUR "SIX" FOR 1913?

Every progressive manufacturer announces a "Six" for 1913. The supremacy of the "Six" is established. It has come to stay. Sooner or later you have got to add a "Six" to your line. Competition will force you to it. Why not now? Your 1913 "Six" at from \$1600 to \$2000 will prove a self-seller if equipped with a

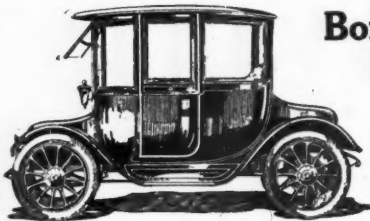
### Beaver "Six" Unit Power Plant

With cylinders  $2\frac{1}{2} \times 5$  inches this motor has the much desired long stroke and just the right power—40-45 H.P. Valves are extra large, and the enclosed valve action is noiseless. Transmission unit enclosed with motor has plate clutch and 8-speed forward selective sliding gear-set. Write for catalog of motors and prices.

#### BEAVER MFG. COMPANY

2800 First Avenue,

MILWAUKEE, WIS.



The Borland 1913 Regular Coupe—\$2900

Besides model illustrated we make: Brougham, \$2500; Roadster, \$2550; Coupe, \$2700, either front or rear drive; 1500-pound delivery truck, open body, \$2100; 1500-pound truck, closed body, \$2250; Limousine, \$5500

Write for agency terms at once

#### THE BORLAND-GRANNIS COMPANY

2634 Michigan Avenue,

CHICAGO

### Borland Electrics Satisfy Owner and Agent

The absolutely perfect construction of the Borland eliminates the necessity for repairs due to defective material or workmanship. Please the owner and insures the dealer the greatest final profit on each sale.

# RAYFIELD

The Better Carburetor



MODEL D

FOR

All Makes of Cars  
All Kinds of Weather  
All Grades of Gasoline

FINDEISEN & KROPP MFG. CO.

21st and Rockwell Sts., Chicago, Ill.

## INTERLOCK INNER TIRES Stop Tire Troubles

The one weak point of the automobile is that you cannot depend on the tires. Thousands of motorists have solved their tire problem by discarding inner shoes, reliners, fillers and other makeshifts and equipping their tires with Interlock Inner Tires.

Interlocks are complete inner tires (not inner shoes) placed between the outer casing and inner tube to strengthen the casing and protect the tube from punctures. They double the mileage of new tires and add 1,000 to 5,000 miles to old ones—save half your tire expense—and make tires trouble proof.

Dealers and Motorists—Investigate Interlocks

Don't delay—write now for booklets, data, prices, testimonials of users, road tests, etc. Mention size and kind of tires you use.

DOUBLE FABRIC TIRE CO., 128 W. 9th Street, Auburn, Indiana

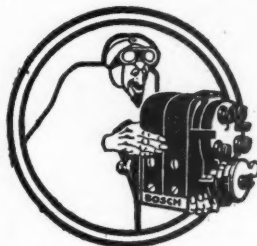
*Packard*

Motor Cars and Trucks



Car or truck catalog on request

Packard Motor Car Company, Detroit



## Bosch Of Course

No matter what car you own or buy it needs a Bosch Magneto with Bosch Plugs.

Be Satisfied

Specify Bosch

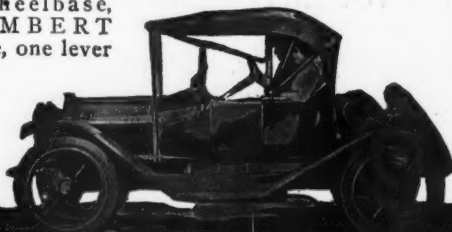
Bosch Magneto Company, New York

*The* **LAMBERT**

The LAMBERT Model 99 (5-passenger touring car or 2-passenger roadster) at \$1,250 stands at the head of

its price class. It comprises  $4\frac{1}{8} \times 5\frac{1}{4}$  Rutenber motor, 117-inch wheelbase, famous LAMBERT friction drive, one lever control, etc. Write for catalog.

BUCKEYE MFG. CO.  
ANDERSON, INU.



## MICHENER'S CHAIN CARBON REMOVER

The one method that never fails. Costs nothing to use. Cleans out every bit in a few minutes. Increases power, prevents knocking and makes the motor run cooler. More economical and efficient than scraping or any other method. Made of soft, tough wire, 90% copper. Guaranteed absolutely harmless to the motor. Thousands in regular use. Recommended by automobile manufacturers. Get two to clean two cylinders at a time.

State make of motor when ordering.

75c each

3 for \$2. Postpaid.

E. S. MICHENER, WASHINGTON ST., NEW CASTLE, PA.



Pat. April 2, 1912

*Republic Staggard Road tires*  
 reduce the danger of skidding  
 to the minimum, as thou-  
 sands of experienced  
 motorists will testify  
*The Republic Rubber Co.*  
*Youngstown, O.*

### THE KENTUCKY THOROUGHbred—"AMES 45"

Long stroke, powerful Continental Motor—  
 Electric (Dynamo) Lights—Self Starter—Left  
 Hand Drive—Full Equipment—"Amesbilt"  
 Bodies and Tops. A combination of power,  
 speed, endurance and graceful lines. Price, fully  
 equipped, \$1,635. This is 1913's most re-  
 markable car value. Backed by a reputation of  
 30 years, it will win you from the first inspec-  
 tion. We have a most liberal proposition for  
 good, live agents. Send for catalog today.

**Ames Motor Car Co., Owensboro, Ky.**

### GASOLINE TURBINES

Half the size      Half the weight  
 Half the fuel      Half the friction

No Valves  
 No Springs

No Adjustment  
 No Fly Wheel  
 No Back Pressure

No Muffler  
 No Noise

There isn't much left

SMOOTH AS ELECTRIC

WILL REPLACE ANY ENGINE IN ANY CAR  
 BOOKLET UPON REQUEST

(Exclusive territory open for live agencies)

**SEMPLE S. SCOTT** 1651 Marquette Building Chicago, Illinois

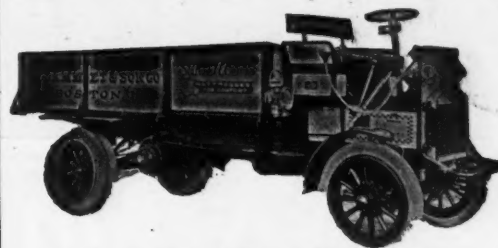


**Diamond**  
**SAFETY TREAD**  
**(Squegee) TIRES**

Won't Slip—Won't Slide  
 Won't Skid—They Grip!

**THE DIAMOND RUBBER CO. OF N. Y.**  
 Subsidiary of The B. F. Goodrich Co.  
 Akron, Ohio

### DECATUR 1½-TON TRUCK



The Truck  
 with a repu-  
 tation for  
**Economy**  
**Efficiency**  
**Durability**  
 and Low Op-  
 erating Cost.  
 Our Trucks  
 are used in  
 sixty-one dif-  
 ferent lines of  
 business.

Write for catalog and complete specifications  
 telling why DECATUR TRUCKS are best

**GRAND RAPIDS MOTOR TRUCK CO.**  
 GRAND RAPIDS, MICHIGAN.

### Save Your Money—Reduce Cost of Upkeep

A Bowser Safe Oil Storage System will do this and  
 more. They are built to conform to that measure of  
 safety prescribed by the National Board of Underwriters.

They come in all sizes, styles and prices, crated ready  
 for your immediate use.

Send for Book No. 4-B. Mailed free upon request.

**S. F. Bowser & Co., Inc.** Home Plant and Ft. Wayne, Ind.  
 General Offices

#### BRANCHES

New York, Chicago, Minneapolis, St. Louis, San Francisco,  
 Denver, Dallas, Atlanta, Toronto

Patentees and manufacturers of standard, self-measuring, hand  
 and power driven pumps, large and small tanks, gasoline and oil  
 storage systems, self-registering pipe line measures, oil filtration  
 and circulating systems, dry cleaner's systems, etc.

ESTABLISHED 1885

**Nyberg SIX**  
**\$1750**

ANNOUNCING 1913 TOURABOUT  
 Complete Specifications Sent on Request  
 —WE WANT LIVE DEALERS—

**NYBERG AUTOMOBILE WORKS**  
 Northern Factory ANDERSON, IND. Chicago Office 207-29 MICHIGAN AVE. Southern Office CHATTANOOGA, TENN.

### MARMON

"The Easiest Riding Car in The World"

#### The Marmon "32"

Four cylinders, 32-40 h.p.,  
 120-inch wheel-base, elec-  
 tric starting and lighting  
 system, left-hand drive,  
 center control, nickel trim-  
 mings, with newest body  
 types to meet every re-  
 quirement and correspond-  
 ing equipment—

\$2,850 to \$4,100

#### The Marmon "48"

Six cylinders, 48-80 h.p.,  
 145-inch wheel-base, elec-  
 tric starting and lighting  
 system, left-hand drive,  
 center control, nickel trim-  
 mings, with body types to  
 meet every requirement  
 and corresponding equip-  
 ment—

\$5,000 to \$6,350

Detailed Information on Request

**NORDYKE & MARMON COMPANY**  
 Indianapolis (Established 1851) Indiana

Sixty Years of Successful Manufacturing

When Writing to Advertisers, Please Mention Motor Age.



**RHINELAND BALL BEARINGS**  
*"INSURANCE FOR BUILDER AND USER"*  
 RHINELAND MACHINE WORKS CO. — 142 WEST 42ND ST. NEW YORK

**SHAWMUT TIRES**  
 SHAWMUT TIRE CO., - - BOSTON, MASS.

**"VULCAN" SPRINGS — THE GOOD KIND**

Figures show that VULCAN Springs last longer than the ordinary kind. Facts prove that they ride easier.

Ford  
Overland  
Buick  
Reo  
Cadillac

Stock on Hand to Fit:

Maxwell  
E. M. F.  
Flanders  
Hupp  
Regal

Hudson  
Chalmers  
Oakland  
R. C. H.  
Everett



**JENKINS MFG. COMPANY,** 3937 Olive St., St. Louis, Mo.  
 324 No. Broad, Philadelphia, Pa.

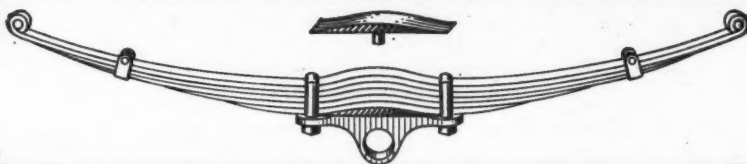
**DO YOU WANT SPRINGS THAT WILL NOT BREAK?**

Cut shows **Titanic Springs**

which have no hole to break at. If broken at center will replace and no questions asked. For any car.

We make also every pattern of **AUTOMOBILE SPRINGS**

**TUTHILL SPRING COMPANY,** 762 Polk St., Chicago



Strength and durability are factors of utmost importance and

**WESTON MOTT & CO.**

FLINT, MICH.

All our products are made to meet the severest tests.

**AXLES, HUBS, RIMS**

KRUPP AUTOMOBILE CRANK SHAFTS, STEEL FORGINGS AND FRAME MEMBERS, GEAR BLANKS, KRUPP BAR STEEL BALL MILLS, TUBE MILLS AND OTHER MACHINERY

**USE KRUPP STEEL**

**CALL FOR KRUPP STEEL  
 IN YOUR CAR AND  
 SEE THAT YOU GET IT**

**THOMAS PROSSER & SON, 28 Platt Street, NEW YORK**

KRUPP STEEL LOCOMOTIVE TIRES AND CAR WHEEL TIRES, CRANK SHAFTS, STEEL FORGINGS AND CASTINGS, STEEL TIERED CAR WHEELS, PROSSER BOILER TUBE EXPANDER

**FIAT**

**"THE MASTER CAR"**

6 Cyl. 50 H. P., \$5,000.

**FIFTEENTH YEAR**

4 Cyl. 55 H. P., \$4,500.

4 Cyl. 35 H. P., \$4,000.

(Completely Equipped)

**POUGHKEEPSIE**

**F.I.A.T.**

**NEW YORK**

**THE STANDARD OIL FOR MOTORS**

We begin to perfect Polarine Motor Oil at the point where other oils are deemed finished. We have spent hundreds of thousands of dollars for the machinery required by these extra processes alone. It is the "cream" of motor oils. You ought to try it.

**Polarine**



**NATIONAL POWER PUMPS**

**"MADE TO WEAR AND PUMP FRESH AIR"**

The only spark plug pump which does not fill your tires with gas. Compare and test it with any other pump on the market and we will get your order. Write for complete description today.

Made by

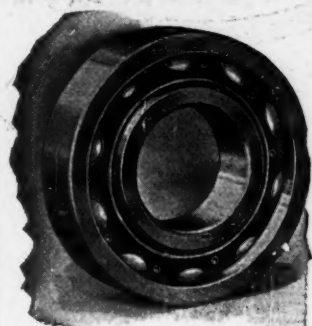
**THE NATIONAL MOTOR SUPPLY CO.**  
 1919 EUCLID AVE., CLEVELAND, OHIO

**Automobile, Motorcycle  
 and Bicycle Supplies**

Ask for catalog "M"  
 Dealers only

**THE BECKLEY-RALSTON CO.,**  
 Mich. Ave. & Randolph St., Chicago

When Writing to Advertisers, Please Mention Motor Age.



## S. R. O.

Oldest and Leading European  
Ball Bearing

*Mea* Magneto

Write for Particulars  
and List of Users.

**MARBURG BROTHERS, Inc.**

Sole Importers

Detroit 1786 Broadway, New York Chicago

## STAPLEY

TIRE PUMP

**Always Ready  
Always Works**

The STAPLEY is a compound pump. Has seamless brass tube cylinders, non-leakable joints, automatic valve and heavy cast base. A Guaranteed tire pressure gauge if you want it.

Price without gauge  
\$4.00

With gauge  
\$6.00

**BRIDGEPORT BRASS COMPANY**

P. O. Station A.

Bridgeport, Conn.



**Specify  
"Gilbert"**

on tire cases  
and get the  
best. Don't let  
your dealer  
substitute.

**Gilbert Mfg. Co.**

New Haven, Conn.

New York Store, 2010 Broadway, Cor. 68th St.

**Wasting Tire Money** That's what you're doing when you allow water and sand to work into the fabric through small cuts and bruises, rotting them and causing blow-outs.

**THE GIBNEY**

**Eleck-Trick Vulcanizer**

seals these cuts and makes tubes and tires run double and treble the usual time

**Easy to Operate—It Operates Itself**

An illustrated book, telling how to double the life of your tires, awaits your request for it.

**JAMES L. GIBNEY & BRO.**

315-217 North Broad Street, PHILADELPHIA, PA.  
248-322 West 54th Street, NEW YORK CITY



✦ the oil that lubricates most ✦

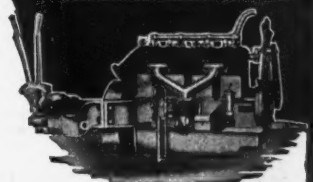
# Mobiloil

A GRADE FOR EACH TYPE OF MOTOR

If oil saves power it follows that one  
oil saves more power than  
another.

VACUUM OIL COMPANY  
Rochester, U. S. A.

## Model Motors



Afford the utmost in reliability and power—with the least weight and fuel consumption. You can add much value to your car by using the Model Motor. We make them better and at less cost than you can, because we specialize in motors and power units. Write us for facts.

**Model Gas Engine Works**

PERU, INDIANA

The **U.S.-L** Electric Starter & Lighter takes the place of the fly-wheel.

The **U.S.-L** Storage Battery (vehicle type) insures lively electric cars and powerful and economical trucks.

The **U.S.-L** Storage Battery (sparker type) means a never failing spark for engine ignition.

**The U. S. Light & Heating Co.**

General Offices: 30 Church St., NEW YORK CITY

BRANCH OFFICES AND SERVICE DEPOTS

NEW YORK BOSTON BUFFALO CLEVELAND DETROIT CHICAGO ST. LOUIS

# "PITTSFIELD"

**Spark Coils  
Are Dependable**

They are long lived, water-proof, heat resisting, simple in construction and of low battery consumption. They give a spark that's a flame. Magnets, Coils, Plugs, Timers, Switches and other Ignition Goods.

Manufactured by

**PITTSFIELD SPARK COIL CO. - Dalton, Mass.**





## Abbott-Detroit

"The demand for the way in which an organization shall be judged by its product and not by what it claims for itself." Keep this in mind when you examine these 1913 models

### MODELS AND PRICES

30-40	Fore-door Roadster, 116-inch wheel base	\$1700
34-40	5-passenger, Fore-Door Touring Car 116-inch wheel base	\$1700
44-50	5-passenger, Fore-Door Demi-Tonneau 121-inch wheel base	\$1975
44-50	7-passenger, Fore-Door Touring Car 121-inch wheel base	\$2000
44-50	Battleship Roadster, 121-inch wheel base	\$2150
44-50	7-passenger, Fore-Door Limousine 121-inch wheel base	\$3050

Advance Catalog on Request

**ABBOTT MOTOR CO.**

806 WATERLOO STREET

DETROIT, MICH.

"Built for Permanence"

"Guaranteed for Life"



## Closing Out Surplus Stock of

**New 1913 Fore-door Roadster Bodies**

**New 1913 Fore-door Touring Car Bodies**

**At Give-Away Prices**

You can make your car a 1913 model with one of our 1913 Fore-door bodies.

Also, stock of motors, axles, etc. Everything pertaining to Auto parts and accessories at the **RIGHT PRICE.**

**Independence Motors Co.**  
Detroit, Mich.

**The Official Car**  
of the U. S. Government and the A.A.A. in their joint survey of

**Three Transcontinental Routes**  
in one season in one car

THE **PATHFINDER 40**  
MADE IN INDIANAPOLIS

Write today for 100 & 1 Reasons why the Pathfinder is the car you will buy.

**The Motor Car Mfg. Co.**  
Indianapolis, Ind.

**The "All-in-One" Spark Plug**

All that the name implies  
Prime your engine and clean your plugs at the same time.

Price **\$1.50** each

**Powerful  
Sootless  
Durable**

Designed and constructed for use with high or low tension magneto and battery ignition systems. Made to fit any engine.

We shall prosecute vigorously all infringements now on the market or any which may spring up in the future.

**FRONTIER SPECIALTY COMPANY**  
707 Main St. Buffalo, N. Y.

**MORE ABOUT**

# GOODRICH TIRES

**Goodrich Safety Tread—  
Best in the Short Stop**

## BEST IN THE LONG RUN

**CONTINENTAL**  
SIX CYLINDER—UNIT POWER PLANT  
THREE POINT SUSPENSION

The Continental "Six" is maintaining, on the road at this minute, the good name made by our Four Cylinder types. Built to accommodate any type of self-starter now made. Suitable for right or left hand drive. Write for booklets.

**CONTINENTAL MOTOR MFG. CO.**  
DETROIT MICHIGAN  
Factory Representative  
K. F. PETERSON  
122 S. Michigan Blvd., Chicago, Ill.

Showing simple and efficient chain drive for starting motor.  
4 and 6 cylinders.  
20 to 70 H. P.

**THE FAMOUS**  
*Packard*  
**Auto Cylinder Oil**

Will not carbonize. A perfect lubricant.

**GREENSLADE OIL CO.** DETROIT MICH

**MAIN OFFICE: DETROIT, MICHIGAN**  
Pacific Coast Agency  
**GEORGE L. and J. A. McPHERSON**  
PORTLAND, OREGON

**Coils    Magnetos    Timers**  
**Spark Plugs**

Catalogue on Request

**SALES OFFICE, DETROIT, MICHIGAN**  
**HEINZE ELECTRIC COMPANY**  
Lowell, Mass.

**MOTZ Cushion Tires**  
For Pleasure Cars and Light Delivery Cars

Send for Pamphlet 55

**The Motz Tire & Rubber Co.**  
Executive Office:  
Akron, Ohio  
Service Stations in All Principal Cities

A—Shows double, notched treads.  
B—Shows undercut sides.  
C—Shows slantwise bridges.  
D—Shows absorbing means when passing over an obstruction

**NEW CATALOG 300 PAGES**  
Ready Feb. 1st

**MOTOR CAR SUPPLIES**  
MOTOR CYCLE  
MACHINISTS' BICYCLE

**WHOLESALE ONLY DEALERS GET YOUR NAME IN**

**MOTOR CAR SUPPLY COMPANY**  
1451-1453-1455 Michigan Ave., Chicago

**4 in 1 Valve Tap and Die**

A tool for threading inside and outside of tire valves, mill for smoothing off end, key for removing and replacing inside. Sent to any part of U. S. upon receipt of 25c.

Special price to dealers and jobbers in quantities  
Dealers—Send us your name for our 1913 Auto Supply Catalogue

**CHICAGO AUTOMOBILE SUPPLY HOUSE**  
1335 So. Michigan Blvd.

If you want good circulation on your automobile, launch or motor boat, use a

**LOBEE PUMP**

**LOBEE PUMP AND MACHINERY CO.**  
240 Terrace,  
Buffalo, New York

# WANTED

**SIDE LINE SALESMEN**

**STURDY MFG. CO.**  
2640 Michigan Ave. CHICAGO

The  
"INNERSHU"



A Tire Reinforcement  
that is

**GUARANTEED**

Ask Any User

Made of the best, is the best, and  
recognized the country over as the  
one that makes good.

**INNER SHOE TIRE CO.**  
GRAND RAPIDS, MICH.

**SPROCKETS**



Chains and  
Differential

In Stock or Order  
Send for New Catalog

**CULLMAN WHEEL CO.**  
1241 Greenwood Terrace, Chicago

**THE LONG  
HORN**

**\$18**

The Hand  
Actuated  
Warning  
Signal.

*It Never Fails*

**THE G. PIEL CO., Long Island City, N. Y.**

**The Assurance of Safety**

That's what you have when your car is  
equipped with **SOLAR LAMPS**. You can ride  
at night with perfect confidence—and that  
means with the utmost possible enjoyment.

Why take ordinary lamps when  
you can have Solars if you insist?

**BADGER BRASS MANUFACTURING CO.**  
Kenosha, Wis. (39) New York City

**Liquid Graphite**

It is known as Oildag. As an automobile  
lubricant it increases power, reduces the  
oil consumption and prevents carbon, spark  
plug and valve troubles.



Ask us to send Booklet 458-P

**INTERNATIONAL**

**ACHESON GRAPHITE CO.**

Niagara Falls, N. Y.

Gen. Agts. for Oildag, made by  
Acheson Oildag Co.

**OAKES  
RADIATOR  
FANS**

The Oakes Co. Indianapolis Ind.

**Hotel Sherman**  
CITY HALL SQUARE  
CHICAGO

Every one of the seven hundred  
and fifty rooms in Hotel Sher-  
man has private bath and circu-  
lating distilled ice water.

Located on City Hall Square—  
right in the heart of the city—  
within easy walking distance of  
every depot, the theater, shops  
and the important business sections.

If you appreciate a hearty welcome, perfect service and cheerful  
surroundings, stop at Hotel Sherman the next time you come to  
Chicago.

The prices are surprisingly moderate.

Single rooms with bath	- - -	\$2, \$2.50, \$4 and \$5 a day
Double rooms with bath	- - -	\$3.50, \$4, \$5 and \$6 a day
Suites	- - -	\$5 to \$15

*A special invitation is extended visiting  
automobile men to make Hotel Sherman their  
headquarters during and after the show.*

The home of one of the most unique and distinctive restaurants in  
America—the famous

**College Inn**

The General Electric Company  
furnishes over 60% of all auto-  
mobile motors, continuous torque  
controllers and resistances pur-  
chased for pleasure and com-  
mercial vehicles.

2982

Principal Office, Schenectady, N. Y.

**Perfection Spring Company**  
Manufactures

High Grade Automobile Springs



Central Ave., Cor. E. 65th St., Cleveland, O.

**BOILERS**

FOR STANLEY STEAM CARS. Also  
Grout, Prescott, Locomobile and Mobile  
Boilers all guaranteed to fit. Special  
boilers 4 to 60 h. p.; repair work.

Steam Carriage Boiler Co., Oswego, N. Y.



**AUTOMOBILE TOPS** Write for  
and prices. We can save you money  
catalogue

**BUOB & SCHEU**  
Court and Broadway, Cincinnati, Ohio



# CLASSIFIED ADVERTISEMENTS

The Trading Center  
of the  
Motor Car Industry

## MOTOR AGE

Rates—20¢ per line  
6 words to a line

### Cars For Sale

**A SPECIALLY BUILT SEVEN-PASSENGER** touring car, very powerful; special motor, 5 1/2 x 6; 140-inch wheel base; wheels and tires, 37x5 1/2; built on the latest lines; completely equipped as to accessories, with two extra tires and four tubes. Write for price. B. A. Gramm, Box 600, Lima, Ohio.

**AUTO RACING TEAM FOR SALE—WILL** sacrifice my special built racing team, three of the fastest cars in the country in perfect condition. One 40 h. p., one 50 h. p., one 150 h. p. French exhibition car, and can prove to you that this team is a money maker. Extra magnetos, carburetors; crank cases, timing gears, tires and full racing equipment. Would prefer selling these cars together, as it would be a shame to break up this team. For full particulars, address C. H. K., 6128 Prairie Ave., Chicago, Ill.

**A 7 PASSENGER, 40 HORSE POWER** White Steamer and one 20 h. p. 4 pass. Both machines like new. Joy valve engines, kerosene burners operating for one-half cent per mile. Address Box D 151, c/o Motor Age. w

**CADILLAC LIMOUSINE, WITH EXTRA** touring body, top, glass front and fenders, overhauled guaranteed like new, 1911 model. Iowa Auto & Tire Co. (Cadillac Agents), Davenport, Iowa.

**COUPE FOR SALE—1912 OVERLAND** coupe with extra roadster body; ideal for physician; full equipment; condition perfect. Box 44, New Brunswick, N. J. w

**FAL CARS AND REPAIRS**  
F. A. L. Auto Co., 4052 Princeton Ave., Chicago. Phone Drover 1712.

**FOR SALE—BRUSH CAR, IN GOOD RUN-** ning order, complete, with top, extra tire and full equipment of tools; at a bargain. Address P. Jonas, 780 Delaware Ave., Milwaukee, Wis.

**FOR SALE—BRUSH RUNABOUT, FIRST-** class running condition; painted red last season; new tires, windshield, new top, detachable rear seats, Presto lights, horn. Cheap if sold at once.  
Henry M. Williams, Machine Shop, Vincennes, Ind.

**FOR SALE CHEAP—A TAXICAB AND A** seven-passenger limousine. William W. Cronin, 571 S. Clinton St., Syracuse, N. Y.

**FOR SALE—CHEAP ONE AMERICAN** Traveler, color battleship gray; just like new; run a little over 5,000 miles. Michigan Auto Co., 410 7th St., Calumet, Mich.

**FOR SALE—DELIVERY CARS; ONE IN-** ternational with top; one Cadillac single-cylinder, overhauled, repainted. Neiman Machine Works, Freeport, Ill.

**FOR SALE—ONE FLANDERS "20," 5 PAS-** senger car in A No. 1 condition at a bargain. Address H. M. Real, 12041 Butler St., Chicago, Ill.

**FOR SALE—ONE FIVE-PASSENGER** touring car. 40 h. p. motor, Stromberg carburetor, Remy magneto and coil, Presto tank, Rushmore lamps, windshield; will sell for painting, repair and storage bill, \$247.50. Ideal Garage Co., Bradford, Pa.

**FOR SALE—ONE MODEL F BUICK, WITH** top, side curtain and storm front, in first class condition; 5 passenger. E. J. Bates, Box 3, Reader, Ill.

**FOR SALE—STEARNS-KNIGHT 1912** model, fully equipped; 6 good tires; car used for demonstrating; selling car to get 6-cylinder Stearns-Knight demonstrator. For full particulars apply L. F. Hayes, Box 432, Terre Haute, Ind.

### FOR SALE

Twenty Motor Trucks,

both electric and gasoline; these trucks are of varied makes; have been used and are still in use by us in Indianapolis in transportation of our freight, but owing to the completion of our large new plant, located direct on private switch tracks, the necessity for hauling our freight is removed, and we are therefore willing to sell very cheaply our entire lot of trucks. These trucks are all from 2-tons capacity up and are in good, serviceable condition. Any person desiring trucks of this class would do well to address

General Traffic Manager,  
The Prest-O-Lite Co.,  
Indianapolis, Ind.

**FOR SALE—PACKARD, 4-CYLINDER, 1909,** 18 car, fully equipped with windshields, shock absorbers and pump for inflating tires; car in excellent condition. Address E. O. Townsend, Mansfield, Ohio.

**FOR SALE—WHITE STEAM CARS, VARI-** ous models, in excellent condition; also parts for steamer engines and generators. We specialize in steamers. Joseph Libal, 3145-53 N. Halsted St., Chicago.

**FOR SALE—1911 MODEL STODDARD-** Dayton automobile, 7-passenger, 50 h. p., equipped with all auxiliaries. In perfect condition. Address Box D 220, c/o Motor Age.

**FOR SALE—6-CYLINDER, 60 H. P. (1911),** specially built Peerless roadster, with extra coupe body; fully equipped with all required accessories of the highest grade. The Clark Garage, 2031 North 29th St., Philadelphia.

**FOR SALE—20 PASSENGER SIGHTSEE-** ing car; good condition; cheap for cash. Box D 140, c/o Motor Age. m

**LATE MODEL PAIGE-DETROIT ROAD-** ster fully equipped in good mechanical condition. Will sell at a very low price. The White Co., 2635 Wabash Ave., Calumet 5311, Chicago.

**MAXWELL RUNABOUT, BOWSER GASO-** line outfit, vulcanizing plant, will sell cheap or trade. Geo. B. Johnson, Lebanon, Ohio.

### MERCER

Demonstrators at greatly reduced prices; raceabout, mile in 51 seconds, \$1250; 1912 4-passenger, \$2100; run about 2,500 miles; investigate if you want a high grade car. The Boss Rubber Co., 1614 Broadway, Denver.

**MITCHELLS REBUILT, GUARANTEED.** These cars are fully equipped. Call or write for further particulars.  
Mitchell Automobile Co.,  
2334-36-38 Michigan Ave., Chicago.

### PREMIER

Rebuilt cars like new.  
Must sell quickly to make room for new Models.  
1911 Stearns. 1910 Winton.  
1911 Chalmers. 1909 Peerless.  
Will make special price to move these cars.  
The Quality Car Co.,  
2329 Michigan Ave., Chicago,  
Cal. 4501.

**PREMIER, SIX-CYLINDER, 7-PASSEN-** ger, just overhauled; all worn parts replaced; run about 8,000 miles; new top, fore-doors, two extra tires, inner tubes, gear-driven tire pump, paint and everything in A-1 condition; looks and runs like new car; at a sacrifice; full equipment. John L. Ketter, 2179 Webster Ave., Pittsburgh, Pa.

**PACKARD DEMI-LIMOUSINE; BEST OF** condition. Krit coupe; just overhauled and painted, for sale cheap. Ajax Auto Co., 834 E. 43d St., Chicago.

**SPEED RATE OF 100 MILES AN HOUR** guaranteed—Stanley racer—low price. Excellent condition. O. P. Tyler, 31 Central St., Worcester, Mass. m

**STEARNS-KNIGHT TOURING CAR.** Condition like new; driven but 3,000 miles; has complete equipment, including seat covers. This car is like new. Have sold original owner 7-passenger Stearns. Price, \$2,250. Manchester Auto Garage, 75 Granite St., Manchester, N. H.

**WE HAVE REAL BARGAINS IN USED** cars: One E. M. F. run less than 7,000 miles; all new tires and complete in every way, \$600; 1 Buick roadster, complete, \$375; 3 1911 Fords, complete, \$375; 1 5-passenger Reo, \$250; 1 Westcott, \$100; 1 McIntyre, \$100. The above cars have recently been overhauled and are in good shape. Mankato Automobile Co., Mankato, Minn.

**WINTER SICK CARBURETERS AND MISS-** ing motors cured by hot-air pipe to carbureter. Absolutely vaporizes gasoline. Pick-up, power, economy gained. You install our complete outfit ten minutes. Outlasts car. Effective and cheap. Write us now for details. Breeze Carbureters, Newark, N. J.

**1905 PACKARD 4-PASSENGER, GOOD** shape, \$300; 1907 Thomas 7-passenger, double chain, \$200; 1-cylinder Cadillac or Olds, each, \$50; 1907 Thomas and model R Stevens, parts cheap, front and rear axles with wheels, \$10. Fred Peulecke, 9237 Houston Ave., South Chicago, Ill.

**1912 VELIE RACETYPE ROADSTER,** fully equipped with Vesta dynamo electric lighting system for all lamps, self starter, 100-mile Warner speedometer, six demountable rims, pressure gauge on gasoline tank. Car in excellent condition. Three new tires, 8,000 miles. CHESTER A. DODGE, Slater Bldg., Worcester, Mass.

**1912 WOODS ELECTRIC DEMONSTRATOR** in first-class condition; driven 1,500 miles. Will sell cheap. Yeggy-Don Sales Co., Rock Island, Ill.

**1913 PACKARD—WILL DISPOSE OF MY** new 1913 6-cylinder, 7-passenger touring car at a bargain, if taken immediately. Address H. M. Wallis, Jr., Racine, Wis.

### Parts and Accessories FOR SALE

**A BATTERY BARGAIN—6-80 STORAGE** batteries, Exide, Vesta, National, Universal, for auto lighting and lighting, \$1.50 to \$7.50. 4105 Cottage Grove Ave., Chicago. a

**ALL NIGHT MACHINE AND GARAGE CO.** Shop operated every hour of every day. No extra charge for night work. Make any part for any car. We hurry up. 7031 So. Chicago Ave., near Cottage Grove Ave., Chicago. Dan Morgan Smith (owner). Phone Normal 3266.

### ATTENTION—HENRY OWNERS

Having purchased the repair business of the Henry Motor Co., we are prepared to fill orders promptly for repairs for Henry cars. Muskegon Automobile Co. Muskegon, Mich.

**AUTOMOBILE BODIES, PLEASURE AND** Commercial.

Foredoors for open-front cars.  
Write for prices.  
Auto Specialty Mfg. Co., 326 E. Market St., Indianapolis, Ind.

**A WET CLOTH AND A PACKAGE OF**  
Ar-Gen-Tor is all that you need to plate all the brass trimmings on your car with a heavy, permanent plate of pure silver. Your car will always look new, and you will not have to polish brass any more. Does not contain mercury or poisonous cyanide. Send \$1 today for large size box.  
Forest City Sales Co.  
Fremont, Neb.

#### BALL & ROLLER BEARINGS, ALL TYPES.

Distributors of  
"F & S" Ball Bearings.  
"New Departure" Ball Bearings.  
"Pressed Steel" Ball Bearings.  
"Standard" Ball and Roller Bearings.  
BALL BEARINGS REPAIRED.  
THE GWILLIAM COMPANY,  
New York—Broadway, at 58th St.  
Philadelphia—1314 Arch St.

**BODIES, FOREDOOR, TOURING RUN-**  
about, \$15.00 to \$50.00. Fenders painted dark blue, \$10.00 set of 4; Selective type 4-speed shifting levers complete with emergency brake lever, \$8.00. Other bargains. Automobile Appliance Co., 1712 Michigan Ave., Chicago, Ill.

**BRAND NEW 35-40 H. P. FOUR CYLIN-**  
der motors, with fan, pump, clutch, magneto and coil. Price \$222.50. Not old, discontinued models, but up-to-date in every way. F. E. Alford, Goshen, Ind.

#### BUICK OWNERS

Why pay two prices for a radiator?  
We guarantee them when we sell them at

Buick "10," "32" and "33".....	\$26.50
Buick "16" and "17".....	32.50
Buick "19" .....	27.50

Write for other makes.

#### AUTO PARTS MFG. CO.

Detroit, Mich.

**CELLULOSIA—BEST SUBSTITUTE FOR**  
glass used in automobile and buggy storm fronts, side curtains, etc. Sheet 20x36 in., 85 cents; 12x20 in., 35 cents. postpaid. Hawes Storm Front Co., Coldwater, Mich.

#### CUT-OUTS

E.M.F., Flanders, Buick, Regal, etc. Complete outfit with brass lock, open pedal, \$1.50. Lincoln Machine Shop, Lincoln, Ill.

#### DETROIT FORE-DOORS

for

E-M-F, Ford and Hudson.  
One piece aluminum; immediate shipment subject to inspection.  
Detroit Fore-Door Co.,

564 Porter St., Detroit, Mich.

#### DISCO SELF-STARTERS

For Sale. Only a few. Equip your car with a self-starter for this winter. Guaranteed new stock. List price, \$50; our price, \$12.50. Parsons Sales Co., 1817 Grand, Kansas City.

**"DON'T ENVY A SMOOTH RUNNING MO-**  
tor, use Hagstrom Spark Plugs and have one." Write for gas tank key and price list to The Hagstrom Bros. Mfg. Co., Inc., Lindsborg, Kan.

#### DON'T GET COLD FEET!

Use Our Heater.  
For full particulars write to  
Garrison Gasoline Engine Specialties Co.,  
251 Richmond Street,  
Desk 1, Philadelphia, Pa.

#### DRAGON REPAIR PARTS.

We manufacture and keep on hand all repair parts for the Dragon cars. We make a specialty of repairing this machine. Philadelphia Machine Works, 67 Laurel St., Philadelphia, Pa.

**ELECTRIC CHARGING BOARD (RECTI-**  
fier); cost \$225; never been used; sell complete for \$75. Columbia Auto Exchange, Atlanta, Ga.

#### ELECTRIC LIGHTING EQUIPMENT.

We can furnish a complete system for \$36. This outfit consists of one 6-volt, 140-ampere battery, two head lights, two side lights, one tail light, wire for car switch and bulbs. Head lights are 10-inch solid brass with silver plated parabola reflectors, and side lights are 5-inch same material. The Ampvo Battery Co., 1607 Michigan Ave., Chicago, Ill.

#### E. M. F. PUSH ROD ADJUSTERS

\$1.50 for complete set delivered. Money back guarantee. Auto Parts Co., Providence, R. I.

#### FORD, HUPP AND MAXWELL

Muffler cut-out machined ready to attach, including lock, open pedal string and cables, \$1.35. Lincoln Machine Shop, Lincoln, Ill.

**FORD FAN BELTS—WOVEN COTTON**  
and silk; outlasts six regular belts. Post-paid, 75c. Dealers write. Angier's, Streator, Ill.

#### FORD OWNERS

A postal brings you our 1912 catalog of 22 necessities for your car. Auto Parts Co., Providence, R. I.

#### FORD OWNERS AND DEALERS!

You will save trouble and money by installing our timer elevating device.  
Ford Parts Specialty Co.,  
1211 Main St., Richmond, Ind.

#### FORD TIRE-SAVING JACKS

\$3.00 per set to advertise. Agents wanted. Robinson Auto Jack Works, Vicksburg, Mich.

#### FORD T OWNERS

Foot throttle or accelerators, \$1.50. Lincoln Machine Shop, Lincoln, Ill.

#### FORD OWNERS

New guaranteed Ford T radiators \$18. model N-R-&-S. Complete with pump. \$23. Write for other makes.

#### AUTO PARTS MFG. CO.

Detroit, Mich.

#### FORE DOORS

Made for all makes of cars. Prompt shipment guaranteed. F. E. Lortz Co., 2503 E. 55th St., Cleveland, O.

#### FORE DOORS

WE HAVE patterns for all cars made in doubled material of pantasote leather; are easily attached; price \$4. BOSTON AUTO TOP CO., 98 Mass. Av., Boston, Mass.

**FOR SALE—A BOWSER GASOLINE OUT-**  
fit complete with 170-gallon underground tank, in first-class condition. Reason for selling, too small for our needs. Price, \$100. Star Auto Co., Pella, Iowa.

**FOR SALE—BROWNIE AUTO ENGINE,**  
complete; coil and carburetor running order, \$20.00. Elkhardt & Remy magnetos, new, for make and break ignition, \$5.00; 2d hand, same, \$3.00. Address Camp, 791 Superior St., Milwaukee, Wis.

**FOR SALE—COUPES FOR IMMEDIATE**  
delivery. Stylish, up-to-date and well constructed. Fit almost any car. Write us. Robbins & Co., Indianapolis, Ind.

**FOR SALE—NEW UNIVERSAL DE-**  
mountable rims, 5 to a set complete, \$10; 32x3½; 34x3½; 34x4; 34x4½. Triple Action Spring Co., 215 E. 21st St., Chicago.

**FOR SALE—ONE LIMOUSINE BODY FOR**  
Stearns 30-60 chassis. Body cost \$1,750 when new; used one season and in perfect condition. Price, \$800 f. o. b. Louisville. Louisville Lozier Company, Louisville, Ky.

**FOR SALE—ONE 1910 5-PASSENGER,**  
body and top, upholstering, in A-1 condition, for 1910 Cadillac chassis. Cadillac Automobile Co., Peoria, Ill.

**FOR SALE—2 PENDERSON 6 SIGHT-**  
feed oil distributors; 1 Lunkenheimer 6 sight-feed oil distributor; 2 single sight feeds for dash; 2 Lunkenheimer Paragon sight-feed oil drip cups, capacity 1 pint. W. H. L., 34 Sumner St., Dorchester, Mass.

**FOR SALE—5½x5½ FOUR-CYCLE MA-**  
rine engine, with full equipment; good condition. Write Box 30, Lansing, Mich.

**FRAMES, 34-INCH WIDE—112 W. B.**  
straight, each .....\$10.00  
Frames, 36-inch wide—112 W. B.  
straight, each ..... 12.00  
Frames, 36-inch wide—124 W. B.  
straight, each ..... 14.00  
Unassembled frames—Kickup 112-inch  
W. B., 34-inch wide, each ..... 8.00  
For assembling each ..... 4.00  
Wheels—34x3½, 32x3½, 36x4½, per set. 12.00  
Axles—40-50 H. P., rear, each...\$45.00 50.00  
30-40-50 H. P., front, each..... 12.00  
Radiators, 30 H. P., honeycomb, each.. 14.00  
Address Box D 169, c/o Motor Age.

#### JANUARY BARGAINS.

35 h. p., 4 cyl. motors, carburetor, magneto, pump, shopworn.....	\$115.00
2-6 cyl., 4½x5, motors, magneto, car- buretor, oiler .....	160.00
Splitdorf magnetos .....	12.00
1½ in. Holly double jet carburetor...	3.00
Mitchell radiator, Models R. T. L. and K. ....	15.00
Oldsmobile radiators .....	20.00
Brown & Lipe electric transmission, 40 h. p. ....	60.00
Wheels—nearly all sizes .....	2.00
Clear vision windshields .....	12.00

Auto Parts Co.,  
515-31 Jackson Blvd., Chicago.

#### JANUARY SALE.

32x3 tires .....	\$ 5.00
32x3½ tires .....	12.50
Tops, silk mohair .....	10.00
All size wheels .....	2.00
Windshield .....	7.00
Speedometer .....	7.00
1-inch carburetor, Puritan .....	1.00
Ford radiator, "P" .....	18.00
Ford radiator, "N-S-R" .....	23.00
Buick radiator, 10 .....	26.00
Bosch magneto, Du 4 .....	24.00
Gasoline tank .....	3.75
Foot rails .....	.75
Oil lamps, each .....	1.00
Tail lamps, each .....	.75
Head lights, pair .....	5.00

PURITAN MACHINE COMPANY,  
51 Tenth St.,  
Detroit, Mich.

#### KEROSENE FOR AUTOMOBILES. NEW

Model B uses successfully half and half mixture lowest grades kerosene and gasoline. Satisfaction guaranteed or money refunded. Greatly increased power, very slow speed on high. Starts easy at zero. Special agents' prices. Department B. The Air Friction Carburetor Co., Dayton, Ohio.

#### LIMOUSINE AND LANDAUET BODIES

At Reduced Prices.

High grade make and latest styles, will fit any standard chassis. We do mounting, painting, and turn out complete jobs, at a saving of 30 per cent.

Pacific Motor Car Exchange Co.,  
229 W. 54th St., New York.

#### MAXWELL PUSH ROD ADJUSTERS

\$1.50 for complete set delivered. Money back guarantee. Auto Parts Co., Providence, R. I.

#### MAXWELL SELF-STARTERS

Prest-O-Lite Tank Starter.

Don't break your back cranking that car when you can get a self-starter made for your car for \$10.

#### AUTO PARTS MFG. CO.

Detroit, Mich.



**MODEL C WINTON, 4-CYLINDER ENGINE** transmission and rear axle, all complete and in good shape, \$100. A. R. Joy, Smith Center, Kan.

**METAL BODIES, SEATS, FORD DOORS,** radiators, hoods, tanks and fenders. If building a car we can give you the right price. Auto Sheet Metal Works, 2228 Michigan Ave., Chicago.

#### MORA REPAIR PARTS

We purchased the repair business of the Mora Company and have in stock repair parts for all models of Mora cars. Philadelphia Machine Works, 67 Laurel St., Philadelphia, Pa.

#### MR. (FORD) OWNER AND GARAGE MAN

The Townsman Valve Adjuster has a cushion for your valve stems and takes away the click, absolutely silencing the valves. They have no screws or burrs to work loose. Saves putting in new push rods and valve stems; they never wear out. Ask your jobber, or address, \$1.50 Prepaid, Townsman Auto Spec. Co., Mitchell, S. D. In ordering give year of car.

**NEW COUPE BODIES FITTED TO CAR,** \$250. Send for photo. Fred Allen Auto Supply Co., 1610 Michigan Ave., Chicago, Ill.

**NEW SEVEN-PASSENGER LIMOUSINE** body, with rear springs and mud guards for model Y Stevens-Duryea. C. C. Stoltz, Marion, Ohio.

**NICKEL PLATE YOUR AUTO TRIMMINGS** with Electro-Nickel. Prevents brass from tarnishing, iron from rusting. This is not a silver or mercury wash. We guarantee it plates (without a battery). Price \$1.00, express prepaid. Write for information. Gun Metal Finish Co., 313 Powers, Block, Decatur, Ill.

**NEW UNIVERSAL DEMOUNTABLE RIMS,** 5 to a set complete, at \$6.00; in sizes of 34x4, 36x4, and 36x4½. Write for our rim part circular. Kastner Tire & Rim Co., 2112 Michigan Ave., Chicago, Ill.

#### OXY-ACETYLENE WELDING PLANTS

The Admiral Welding Machine is the ideal welding device; large capacity; self-generating throughout; portable; complete in every detail; a perfect machine for all work, large or small. Send for our booklet, "Welding," and full description. Price, \$200 f. o. b. Kansas City. Admiral Mfg. Co., 715 Lydia Ave., Kansas City, Mo.

**PARKINS CARBURETOR, ELECTRIC** Horn, Complete Lighting System for Car, Dynamo, Battery, Lamps, Switches, Sockets. Low Prices for Quick Sale. Young, Nyack Ave., Lansdowne, Pa.

**PARTS FOR CADILLAC 1907 OR 1908** Model G; half price. D. M. Keene, 604 Lumber Exchange, Minneapolis, Minn.

#### PEERLESS AUTO TOP DRESSING

For Mohair and Duck Automobile Tops and Curtains.

**PEERLESS LEATHER TOP DRESSING** For Leather and Pantasote Tops and Curtains.

**PEERLESS LINING DYE** For Dyeing Linings of all Tops and Curtains Black.

**PEERLESS BACK AND CUSHION DRESSING** For Brightening Leather Backs and Cushions.

**PEERLESS EXTRA FINE BLACK JAPAN** For Enameling Lamps, Radiators and Fenders—Air Drying.

**PEERLESS EXTRA FINE BLACK BAKING JAPAN** For Enameling Lamps, Radiators and Fenders.

Manufactured only by

**THE COLUMBUS VARNISH CO.,**  
Columbus, Ohio.

**PENNANTS FOR AUTOMOBILES MADE** in rights and lefts from any colored felts desired; size 12x30. Price \$1.00 per pair. Cash with order. Liberal discount to dealers. J. C. Orcutt & Co., Inc., Lincoln, Neb.

**REPAINT YOUR CAR YOURSELF—WITH** our materials and full instructions, you can repaint your car as well as a regular painter and save from \$25 to \$50, depending on its size. Previous experience unnecessary. Latest colors. Write today for full information and color cards. We also make Liquid Gun Metal, the National Brass Enamel, \$1 a can, express prepaid. The only articles of proven merit for lamps, radiators, etc. No polishing. Arsenal Varnish Co., Automobile Dept., Rock Island, Ill.

**REPAIR CURTAIN WINDOWS** with transparent flexible Pyralin. Sheet 18x20, 50 cents; 30x36, 90 cents postpaid. Truscott Supply Co., St. Joseph, Mich.

**SAVE WORRY—A PITLESS AUTO TURN-**table solves the problem. Catalogues on request. H. I. Forney, 1923 E. Lincoln, Neb.

**SEAT COVERS FOR ALL CARS—SPECIAL** price on Fords. We clean old covers; make them look like new. Auto Cape Top Co., 2334 Michigan Ave., Chicago.

#### STARTERS

Automatic spring type. Guaranteed \$100 to \$125. J. W. Tudor, 35 Congress St., Boston, Mass.

#### THE MULTITUDES ARE TESTIFYING

to the wonderful qualities of

#### AR-GEN-TOR

the plating compound that actually plates your trimmings, copper, steel, brass, etc., in one minute.

A lasting plate of silver that is pure and beautiful. Don't try anything. Use the plater that the other fellow has used and has tested its sterling worth.

One box will plate all the trimmings on your car.

Send \$1.00 today. Don't put it off.

Ten cents will bring liberal sample.

Forest City Sales Co.,  
Fremont, Nebr.

**TOPS BUILT, RECOVERED AND RE-**paired.  
C. G. Meyer & Son, Tiffin, Ohio.

**WHITE STEAMER GENERATOR AND** burner, almost new. Will sell cheap. Address Box D 245, c/o Motor Age. w

**40 H. P. POPE-HARTFORD ENGINE, USED** one season. \$175; one A No. 3 Stromberg carburetor, like new. \$15.00; one slightly used Klaxon horn, \$15.00; one model 27 Stewart speedometer, \$8.50. Pope-Toledo parts for sale. Auto Salvage and Parts House, 1436 Wabash Ave., Chicago.

#### For Sale or Exchange

**FOR SALE—OR TRADE, ONE STUDE-**baker taxicab. Will trade for touring car or roadster. E. B. Collins, 117 West Main St., Danville, Ill.

**FOR SALE—250 ONE-TON AUTO EX-**press bodies, or will trade for truck and runabout. A. TRAUB, Jackson, Mich.

**HAVE MODEL S FORD RUNABOUT WILL** trade for good lathe and drill press. Box 393, Lincoln, Kas.

#### Parts and Accessories

##### WANTED

**WANTED—NEW OR SLIGHTLY USED** unit power plant, 25 or 30 h. p., 4 cyl. Must be bargain. Benton & Ives, Klowa, Kansas.

**WANTED—ONE 1911 MODEL 52 OR 54** Overland body. D. E. Knapp, 716 W. Water St., Elmira, N. Y.

**WANTED—ONE 1912 5-PASSENGER BODY** to fit 1912 Cadillac chassis. Cadillac Automobile Co., Peoria, Ill.

**WANTED—SECOND HAND WILLIAMS'** Vulcanizing Moulds, No. 11 or 5; state price.

C. R. Tice,  
No. 23 7th Ave., Roanoke, Virginia.

**WE ARE IN THE MARKET FOR JOB** lots of all kinds of car parts; complete and incomplete automobiles, new or second-hand, in carload lots. Give particulars and price when writing. The Jones Auto Exchange, Wichita, Kan.

#### Auto Wearing Apparel

**ATTENTION—HAVE A FEW MANUFAC-**turer's samples, gentlemen's black broad-cloth fur lined overcoats lined throughout with Australian mink. Large, genuine Persian lamb collars, sizes 36 to 48. Value, \$75; will sacrifice for \$35 each. Also several ladies' handsome long fur coats, satin lined, worth \$90, while they last, \$35; and a few large size fur robes, plush lined, \$15 each. All guaranteed new. Examine before buying. Send express charges. Will send on approval. Write or call, E. Roberts, Room 6, 160 West 119th St., New York.

#### Cars Wanted

**WANTED—1912 AUTO IN EXCHANGE** for 160 acres good Minnesota land. Address Box 414, Marshalltown, Ia. k

#### WE BUY SECOND HAND AUTOMOBILES

For Spot Cash

Anywhere in the United States

Send us complete descrip-

tion and lowest cash price.

AUTO TRADING CO., INC.

5916-18-20 Center Ave., Pittsburgh, Pa.

#### Situations Wanted

**A COMPETENT SALESMAN, DEMON-**strator and service man, familiar with southern territory, is open for 1913 position to represent a progressive line of cars and commercial trucks. Address J. F., Colonial Hotel, Birmingham, Ala.

#### BRANCH MANAGER.

Experienced man in the trade desires position on salary and commission basis. Box D 237, c/o Motor Age. f

**CHAUFFEUR, PROFESSIONAL, FROM** Maine; good references; good driver and repair man; six years' experience on four and six-cylinder cars. No. 82 Rockland St., Suite 3, Roxbury, Mass. s

**CHAUFFEUR WISHES POSITION; 4 YRS.** experience; does own repairing; not afraid of work. Werner, 2420 Lorillard pl, Bronx, N. Y.

#### GARAGE FOREMAN.

First class mechanic; have both garage and factory experience; open for an engagement where a high grade man is required. Address Box D 251, c/o Motor Age. s

**MANAGER OR DISTRICT SALES MAN-**ager is open for engagement (until recently employed by Abbott Motor Co., as District Manager). Have thorough knowledge of both retail and wholesale methods, and acquainted throughout both the Middle and Northwest, also Eastern territory. Am considered to be a first-class, resourceful business producer. Will guarantee to make good; would consider first-class accessory or tire proposition. Desire connection with first-class house where the services of a high-class man will be appreciated, monetarily and otherwise. Address Box D 216, c/o Motor Age.

**MECHANICAL ENGINEER WITH SUC-**cessful cars on market; expert designer and efficient producer of modern, commercial and pleasure cars; open for engagement. Will be at Chicago Show. Address W. Stewart, 1029 Baldwin Ave., Detroit, Mich.

**MECHANICAL ENGINEER WITH THREE** successful cars at 1913 shows, New York and Chicago; expert in up-to-date design and economical construction of commercial and pleasure cars; open for engagement after January 15. Please address Box D 222, c/o Motor Age.

**MECHANICAL ENGINEER, 12 YEARS'** experience in the designing and manufacture of automobiles, wishes to connect himself with progressive motor truck firm as chief engineer or superintendent. Will be at Chicago Show. Address Box D 229, c/o Motor Age.

#### SALES MANAGER.

Experienced business man with very wide trade acquaintance wishes to market output of truck factory on salary and commission basis. Box D 238, c/o Motor Age.

**SITUATION WANTED AS CHAUFFEUR** by young, energetic, reliable man; can furnish best of reference; have license; will go out of town. Box D 259, c/o Motor Age.

**THOROUGH, EXPERIENCED SERVICE** department executive; excellent references. Will consider traveling. Have six years' sales experience. Address Box D 258, c/o Motor Age.

**WANTED—LOCATION IN LIVE CITY OF** from 4,000 to 6,000 pop., where there are no first class auto and gas engine repairmen. Will consider nothing but an A-1 opening, as there are many worthless places open. Am no would-be. Investigate. Address Box D 254, c/o Motor Age.

**WANTED—POSITION AS CHAUFFEUR OR** in garage by young man; have had experience in driving and repairing gasoline and electric cars and motorcycles; any location; references furnished. D 257, c/o Motor Age.

**WANTED—POSITION AS MANAGER OR** owner of the repair department of a real live up-to-date Automobile Sales Co.; no cheap skate concern, but one that knows its business. Address Box D 256, Motor Age.

**WANTED—POSITION WITH BIG AUTO-**mobile concern as trouble man; to look after agents' troubles. Am doing good business and am no would-be or has-been, but can do it. No Cheap John. Investigate. Address Box D 255, c/o Motor Age.

### Help Wanted

#### AAA OPEN POSITIONS

With automobile concerns exclusively. Are just as represented, not "catchy ads." All information confidential. If you are a good man, we want you. Write us today. We may have an opening in your city.

We have stood the test for 10 years. An enormous Engineering Department.

Designer, \$2500, light car; Works Manager, \$3000-\$5000, axles and parts; Works Manager, \$4000-\$6000, trucks; Lay-Out Man, \$1200, pleasure chassis; Inspector, \$1500-\$1800, machine dept.; Demonstrator, \$1200, engines; Production Man, \$2500; Assembly Demonstrator, \$1200-\$1500; Designer, \$1500, compressors; Designer, \$1500-\$1800, tools and jigs; Designer, \$2500-\$4000, engines; Foreman, \$1500-\$1800, machine shop; Woodwork Foreman, \$1500, bodies; Apprentice Director, \$1800-\$4000, train shop men; Several Bookkeepers, Clerks, and Salesmen; 6 Machinists, 40-45c, lathe, boring mill and dies. Over 50 openings for all kinds shop help, at best wages. Write us immediately. Do it NOW.

**BUSINESS MEN'S CLEARING HOUSE,**  
323, 108 S. La Salle St., Chicago.

**FIRST-CLASS FOREMAN; MAN CAPABLE** of running shop employing from ten to twenty men; also must be expert automobile repairman; one hundred miles south of Chicago; references required. Address Box D 233, c/o Motor Age.

**MECHANICAL ENGINEERS, SUPERIN-**tendents, works managers and designers wanted. The Engineering Agency, Inc., Monadnock Bldg., Chicago.

**SALESMAN—ONE WHO IS NOW VISITING** automobile trade or owners. Good money made on a very attractive proposition. Sturdy Mfg. Co., 2637 Michigan Ave., Chicago.

**WANTED—A FIRST-CLASS RADIATOR** and lamp repairman. Bennett Auto Supply Co., Sioux City, Iowa.

**WANTED—A NO. 1 AUTOMOBILE ME-**chanic. One who knows his business and is a good machinist. Have good machinery to work with. Steady job. Must be strictly sober. Coucho Machine Works, San Angelo, Tex.

**WANTED—AUTOMOBILE SALESMAN TO** sell high grade medium priced six-cylinder cars in Milwaukee and adjoining territory. The right proposition to party who can show successful sales record. Address Box D 252, c/o Motor Age.

**WANTED—AUTOMOBILE SALESMAN** who can actually sell motor cars. Excellent lines and a good proposition for the right man. Vancouver Island Motor Co., Ltd., Victoria, B. C.

**WANTED—MAN TO TAKE CHARGE OF** engineering department of prominent ignition manufacturers. Must possess thorough technical and broad knowledge of High-Tension Magneto and Ignition apparatus generally. Position offers good prospects to a good man. Reply to state full particulars of experience, age and salary expected. Box D 207, c/o Motor Age.

**WANTED—SALESMEN CALLING ON** garage trade to carry the best device of the kind as a side line; good commission. Give reference.  
The Sterling Absorber Co.,  
Wabash, Ind.

**WANTED—SALESMEN TO CARRY SIDE** line of electric horns. Well advertised make. Reference required. Address Box D 253, c/o Motor Age.

### Radiator and Lamp Repairing

**A-A-A RADIATORS MANUFACTURED** and repaired. Leaky radiators of any make repaired and returned same day. We can make any style radiator and ship in 3 days. Prices reasonable. Discount to dealers. Sheppard Co., 1331 Jackson Boul., Chicago.

#### AA1 AUTO LAMP REPAIRING

All Radiators repaired by expert workmen.  
All work guaranteed by the  
Michaud Metal Works, 1615 Wabash Ave., Chicago. Tel. Cal. 5286; Auto. 67-337.

**ALL KINDS OF AUTO RADIATORS,** hoods, fenders and lamps, etc., rebuilt and repaired. Also general sheet metal work. Phone or mail order. L. Blumenfeld & Co., 1919 Wabash Ave., Chicago. Tel. Cal. 4583.

**CHICAGO MANUFACTURING COMPANY,** 1466 Michigan Ave., Chicago. Manufacturers of Radiators, Hoods, Fenders and Tanks. First-class repairing, including lamps and windshields. Phone Cal. 4167.

#### EXPERT REPAIR WORK

on Radiators, Hoods, Fenders, Dashes, Tanks and Drip Pans. We guarantee all our work. Arrow Radiator Repair Co., 1331 Wabash Ave., Cal. 1995, Chicago.

**THE M. & L. AUTO SHEET METAL** Works rebuild and repair radiators, hoods, fenders, tanks, lamps, etc.  
1551 Michigan Ave., Chicago, Ill.  
Tel. Cal. 2348.

**ONLY RADIATOR FACTORY IN NORTH-**west. Eleven years' knowing how. Why send your Radiator down East when you can ship it to us; save Time, Express, Freight. Money, and get best workmanship. Prices right. Make new Radiators; allow for old one.

Todd Manufacturing Co.,  
820 Mary Pl., Minneapolis, Minn.

**TRY US ON RADIATOR REPAIRS; ALL** work guaranteed; prices less than half what others charge.

Times Square Automobile Co.,  
1210-1212 Michigan Ave., Chicago.

### Ignition Repairing

**IGNITION AND LIGHTING APPARATUS** repaired successfully where others fail. Parts in stock for all makes. Send your next work to us and be convinced. Catalogue sent free. Pellet's Magneto Exchange, 1463 Michigan Ave., Chicago, Ill.

### Rebuilding and Repairing

**ANDRE G. CATELAIN**  
Automobile Garage and  
General Machine Work  
For Foreign and American Cars  
Welding all kinds of metal  
Manufacturer Catelain Hose Coupling.  
1446-8 Indiana Ave. Tel. Calumet 1187  
Chicago.

**AUTOMOBILE CYLINDERS REGROUND,** new pistons and rings fitted. Garage Air Compressors. Cast Iron Brazing Co., Manchester, N. H.

**BROKEN CYLINDERS AND CRANKCASES**—Send them to be made good as new at fraction of replacement cost. Scored cylinders repaired. No new pistons and rings required because bore is not enlarged. Where cylinders are worn (not scored from loose wrist pin) reboring is only remedy. We do it expertly. Write for complete information and estimates. Waterbury Welding Company, Waterbury, Conn.

**CYLINDERS REBORED, PISTONS AND** rings fitted; \$8.00 to \$12.00 per cyl.; gear cutting in nickel steel, rawhide, fiber, brass, etc. Crankshafts, connection rods, gear sets, axles, crankcases, reproduced like original; send broken or worn parts to go by. The Shop of Quality.  
McCadden Machine Works,  
St. Cloud, Minn.

**CYLINDERS REGROUND AND FITTED** with new pistons and rings from \$7 to \$11 per cylinder. Gear cutting in steel, brass, rawhide, fiber, etc. Send us your old parts and we will make you new ones like originals, often cheaper than you can get them from the manufacturer. The Crown Machine Shop, Crown Point, Ind.

**CYLINDERS REGROUND** and fitted with new pistons and rings for \$15 per cylinder. We make parts and cut gears of all kinds. Send us your old parts and we will repair or duplicate them in record time. Cracked cylinders, gear cases, etc., welded and made good as new. Aluminum, bronze and brass castings of every description. The Adapt Machinery Co., 1624 Wabash Ave., Chicago, Ill.

**FORE DOORS, REPAIRING AND PAINT-**ing; special bodies built to order. High tension Bosch magnetos. Second hand cars and motorcycles. Riverside Garage, 815 W. 30th, Indianapolis, Ind.

**POWERFUL AND QUIETER MOTORS ARE** guaranteed by us where we regrind your cylinders, with new pistons and rings to fit; the charge is \$10 complete per hole; accuracy guaranteed. Merritt Co., 311 West Fifty-ninth St., New York City.

### Automobile Schools

**AAAA CHAUFFEUR AND REPAIR MAN,** Tester, Salesman and Demonstrator—We guarantee to qualify you for all of above positions in a short time or we will refund your money. Come to Detroit, "The Automobile Center," and learn the business.  
Michigan State Auto School,  
The Old Reliable School,  
11 to 17 Selden Ave., near Woodward,  
Dept. M., Detroit, Mich.

**AA1 IS HOW OUR STUDENTS STAND** with auto owners. Our school is the oldest, best equipped, most practical and successful in America. Write, phone or call for particulars. Auto School of America, Dept. M., 1600 Mich. Ave., Chicago. Tel. 1088 Cal.



**AUTOMOBILE ENGINEERING**

We teach everything pertaining to the automobile industry. If you are considering taking up any branch of the work, we can aid you more than any other institution.

**WOLVERINE AUTOMOBILE COLLEGE**  
(Pre-eminently the Best),  
940-942 Jefferson Ave.,  
Detroit, Michigan.

Dept. G.

**AUTOMOBILE SCHOOL**

F. E. Edwards'  
Automobile School and College of Motoring.  
1427 Wabash Ave., Chicago.  
The Reliable School.  
Write for particulars.

**GREER COLLEGE OF MOTORING**

Opposite Coliseum, 1459 Wabash Ave., Chicago. A practical education; 100 automobiles, 2 entire floors; 8 instructors; day and evening classes. Free booklet. Phone Calumet 327.

**YOU CAN LEARN TO BE A CHAUFFEUR** or repairman in five weeks by the "Y. M. C. A. System"—shop work, lectures, actual driving, repairing. Complete shop and garage; seven cars, five expert instructors. Over one thousand successful graduates. Old reliable school. Send for Booklet C.

Y. M. C. A. Automobile School  
Seventh and Walnut, Cincinnati, Ohio.

**Welding****AMERICAN WELDING CO.,**

2637 Michigan Ave., Chicago.  
Autogenous welding of all metals, such as crankcases, cylinders, etc. We positively guarantee all work. Tel. Calumet 3563.

**AUTOGENOUS WELDING.**

Automobile cylinders and crankcases a specialty. We guarantee the welds.  
C. Sorensen, 18 East 16th St., Chicago.

**BRAZING AND WELDING CO.**

of Chicago  
All metals brazed and welded are guaranteed. Experts in aluminum welding. Send for circular on aluminum welding. 1615 Wabash Ave. Tel. Calumet 5286.

**BROKEN CRANKSHAFTS, CRANKCASES,** cylinders, flywheels, gears, pistons perfectly welded and machined, ready to replace. Scored cylinders made new. Booklet. Atlas Welding Works, Rahway, N. J.

**WELDING**

Cast iron, aluminum and all metals.  
National Welding & Mfg. Co., Inc.,  
523 Jackson Blvd., Chicago, Ill.

**WELDING**

Cast iron, steel and aluminum welding. Crankshafts, crankcases, cylinders, or any other parts of machinery repaired. Sterling Engine Co., 331-333 S. Clinton St., Chicago.

**WE WELD AND ABSOLUTELY**

Guarantee  
our welds to hold, cylinders (cracked in or outside), crankshafts, aluminum crankcases, transmission cases, housings, etc., by the Ox-weld process of welding and cutting metals. Estimates furnished for job or repair welding and cutting operations of all kinds. Ox-weld Acetylene Co., 37th St. and Jasper Pl., Chicago, Illinois. Down town receiving station, 557-561 W. Jackson Blvd.

**Garages**

**PORTABLE AUTOMOBILE GARAGES,** portable summer cottages, all descriptions. Alfio Cons. Co., 3652 Armitage Ave., Chicago.

**PORTABLE GARAGES**

All kinds of portable houses built by  
KARR PORTABLE HOUSE CO.

Send for illustrated catalogue.  
2554 Irving Park Blvd. Chicago

**Automobile Shipping**

**REDUCED RATES ON AUTOMOBILES** & Household Goods to and from California. Bekin's Household Shipping Co., 530 First National Bank Building, Phone Central 4576. Chicago, Ill.

**Patent Attorneys****ATTENTION—PATENT YOUR INVENTION**

Free search and opinion. Send for Inventor's Primer, free. Milo B. Stevens & Co., 312 S. Dearborn St., Chicago. Established 1864. Main Office, Washington.

**C. L. PARKER, PATENT ATTORNEY,** Formerly member Examining Corps, U. S. Patent Office. 960 G St., Washington, D. C. Pamphlet of instruction sent upon request.

**IMPROVEMENT IN AUTOMOBILES AND**

parts wanted; send sketch.  
H. J. Sanders,  
29 Crilly Building, Chicago, Ill.

**ROBT. KLOTZ, PAT. ATTY., MECH. EXP-**ert; booklet free; patents for all countries. 139 N. Clark St., Chicago, Ill.

**Patterns****HIGH GRADE AUTOMOBILE AND MACHINE PATTERNS;** right price and prompt delivery guaranteed. W. J. Nobach Pattern Works, 522 W. Jackson Blvd., Chicago.**OTTO RABE**

Practical pattern and model maker; automobile patterns a specialty. 158-162 N. Desplaines St., Chicago. Tel. 441 Monroe.

**Mechanical Engineers**

**MACHINE DESIGNING INVENTORS'** Ideas developed. Working drawings. Machinery designed to order. Cary L. Abbott, Mech. Engineer, 1241 Unity Bldg., Chicago.

**Magnetos****MAGNETOS**

Repaired, remagnetized; prompt service on all makes.  
Get our exchange proposition on new K-W for old equipment.

Spark Coil, Storage Battery and Carburetor Repairs.

Northwestern distributors.  
K-W magnetos, Schebler carburetors, Vesta lighting equipments.  
Reinhard Brothers Co.,  
Successors to Hollis Electric Co.,  
Minneapolis, Minn.

**Insurance**

**AUTOMOBILES INSURED AGAINST FIRE,** theft, collision and liability. Covers anywhere. Old line company—lowest rates. Alfion E. Bahr, 1929 Ins. Exch., Chicago.

\$5,000 for \$12 PER YEAR COVERS ALL accidents. \$25 weekly indemnity. States Accident Co., 1015 Insurance Bldg., Chicago.

**Business Opportunities**

**A GOOD PAYING AUTO OILS AND** grease business for sale on automobile row of Chicago. Good reasons for selling. Will stand inspection. Address Box D249, care Motor Age.

**AUTO DEALERS**

Office space and storage room for auto agency. Fireproof building. 704 Prospect, Kansas City, Mo.

**FOR RENT—TWO FLOORS, 25,000 SQ. FT.,** corner Automobile Building. Low rent. Address owner, 3145-53 North Halsted St., Chicago, Ill.

**FOR SALE—BEST ESTABLISHED AUTO-**mobile business in Upper Peninsula of Michigan. Garage and salesroom strictly up-to-date and may be bought or rented. Reason for selling, present proprietors wish to devote entire attention to manufacturing. Easy terms will be allowed to right party. Inquire of Box D 217, c/o Motor Age.

**FOR SALE CHEAP—AUTO TIRE SHOP** with all first class, complete equipments; stock, charter, good will, etc.; fine location, no debts. Established six years. Call or write. 1547 Michigan Ave., Chicago.

**FOR SALE—HAYWOOD VULCANIZER,** Model H, used three months; perfect condition; guaranteed; price very low. Box D 241, c/o Motor Age.

**FOR SALE OR LEASE—THE MOST MOD-**ern garage in Southern Colorado, with fine repair shop and storage room for sixteen cars, doing good business and fine prospects for coming year. A snap for someone. Address Box 208, Monte Vista, Colo.

**HALF INTEREST IN GARAGE AND RE-**

pair shop for sale.  
L. R. Weeks,  
Pringhar, Iowa.

**TO RENT—MODERN BUILDING, 1509**

Mich. Ave.; three floors, 25x161. First floor tile. Building contains office fixtures, Bowser tank, etc. Large elevator and large show window. Best location in town for auto establishment and other lines. Apply Goldenberg Furniture Co., 1837 So. State St., Chicago. Telephone Calumet 978.

**PARTNER-SALESMAN WANTED—HAVE**

garage and agency for two counties; \$2,000 to \$5,000 required. Will be at New York Show. Box D 246, c/o Motor Age.

**RURAL PARCELS POST DELIVERY CAR.**

A valuable side line to established auto factory. Parties interested in promoting correspond with E. P. Cowles, Sparta, Mich.

**THE GREATEST AUTO WHEEL EVER**

Invented; years in advance; which has no competition (Pat. issued Dec. 24). Wish to place on royalty with some competent manufacturer or sell. E. A. Finzer, Hicksville, O.

**THOSE INTERESTED IN THE BRAKING**

proposition. I have lately had issued to me a patent brake that brakes in either direction equally as well. The pressure on the brake disc is radial in all directions and encloses the brake disc. Its entire circumference leaves no open space between the disc and band, therefore the pressure on the disc is equal in all directions, giving no side pull on the axle or wheel. It is very powerful and would be suitable for motor trucks as well as touring cars. I would be pleased to negotiate with someone to buy or form a company to manufacture. Address Box D 240, c/o Motor Age.

**TO RENT—1537 MICH. AVE.—BEAUTIFUL**

store and second floor, or each separately, 30 by 161. Ideal location for auto establishment or any other line. Apply Goldenberg Furniture Co., 1837 So. State St., Chicago.

**WANTED—LOCATION IN SOUTHERN**

town for garage and repair shop, by two practical mechanics. Will move to new location, shop and tire repair plant valued at about \$2,000. Address Box D 231, c/o Motor Age.

**Automobile Books and Maps for Motorists****A. L. DYKE'S AUTO INSTRUCTION—A**

new idea of instructing you to run and repair automobiles at home with working models (from London), charts, etc. Indorsed by Duryea, Oldfield, Splitdorf. Send for free 32-page illustrated and interesting book. A. L. Dyke, Box 16, Roe Bldg., St. Louis, Mo.

**"FORD MODEL T REFERENCE BOOK"**

gives cause and cure of all the ails of Model T simply and concisely. Written especially for it. Gives the latest kinks. Full of pointers. Elaborate cross index enables you to discover any trouble at once. Write for descriptive circular or sent postpaid, \$1.00. Ford Reference Book Co., 57 West 125th St., New York.

**HOW TO RUN AN AUTO**

With a copy of Audel's answers on automobiles, \$1.50, you can know all about carburetors, ignition, timing, engine troubles, overhauling and driving. A complete course in 500 pages, with 375 diagrams highly endorsed by men who know. \$1.50 postpaid to any address. Money back if not pleased. Send postal for free circular.

Theo. Audel Co., Publishers,  
72 Fifth Ave., New York City.

**GAS ENGINE TROUBLES AND INSTALLATION.** Cloth, \$1.00; flexible leather, \$1.50. Automobile Troubles and How to Remedy Them. Cloth, \$1.00; leather, \$1.50. Ten other practical and reliable mechanical books. Send for circular.

Chas. C. Thompson Co.,  
1128 S. Wabash Ave., Chicago.

#### PARTS AND ACCESSORY MAKERS

The motorcycle field is well worth your attention; 75,000 new machines in 1912. Leading medium Motorcycle Illustrated, 51 Chambers St., New York City. Paid circulation over 8,600.

#### Mailing Lists

**AUTO LISTS—OWNERS, ETC., OF ANY State.** S. H. Carroll, Jr., Albany, N. Y.

#### AUTOMOBILE MAILING LISTS

We can furnish 472,000 Automobile Owners, segregated by States. \$2.00 per thousand, in lots of 1,000 to 10,000; over that, \$1.50 per thousand. Also Dealers, Garages, Repair Men, Manufacturers, etc. Ask for our "Silent Salesman," No. 53, showing 2,000 other classified lists. It's free.

TRADE CIRCULAR ADDRESSING CO.,

166½ W. Adams St.,

Chicago.

Phone Franklin 1182.

Established 1880.

**NEW ENGLAND AUTO LIST AND TOURIST** includes weekly list of all N. E. Auto Owners, Garages, Dealers, etc., with maps. Selected N. E. routes and motor news. \$10.00 yearly. 138 Pearl St., Boston, Mass.

**MANUFACTURERS AND AGENTS—Attention!** Printed list, names and addresses of over 3600 Automobile Owners in the State of Kentucky, compiled from the books of the Secretary of State. Price \$2.00. Send for it today. Weekly or monthly additions supplied at reasonable rates. Prompt service guaranteed. Keep your List up-to-date. Ellis J. Allen, 726 S. 36th St. (Sta. H), Louisville, Ky.

#### Aviation

**HOW TO BECOME AN AVIATOR** and all that a future aerial chauffeur needs to know is told weekly in Aero and Hydro. At all newsstands, 10c, or from the publishers. Three months, \$1; one year, \$3. Aero and Hydro, 535 S. Dearborn St., Chicago.

#### Miscellaneous

I WANT 2 COPIES, AUGUST 31, 1911, issues Motor Age. Will pay 25 cents each. Address Box D 250, c/o Motor Age.

**DURING AUTO SHOW WILL SUBLET FOR** two weeks front part of first or second floor, or both, to responsible party; fine location for exhibits, being opposite First Regiment Armory. Call or write 1547 Michigan Ave., Chicago.

#### Hotels

**HOTEL WYCHMERE, EUROPEAN,** Indiana Ave. and Eighteenth St., Chicago. In the very center of automobile district. 75c to \$1.50 per day; with bath, \$1.00 to \$2.00. Clean, comfortable rooms. Fine 40c table d'hôte. Take South Side trolley to door.

#### Automobile School

F. E. EDWARDS,  
Automobile School and College of Motoring  
1427 Wabash Ave. Chicago  
Write for Particulars  
**THE RELIABLE SCHOOL**

## Don't Overlook This Opportunity

### What Opportunity?

# Motor Age Chicago Show Numbers

Do you know this is **Trading Time** in Motordom?

Do you know that permanent changes are being made—positions filled—accessories bought and sold—agencies established—contracts placed—used cars bought and sold—etc., at this time of year?

Do you know that MOTOR AGE will publish its Great Chicago Show Numbers January 30 and February 6—the Greatest Show Publications of the Year?

If not—now is the time to come out of that Rip Van Winkle state and **do something.**

Be alive, alert and push your proposition to the limit. You can do it through

# Motor Age Classified Columns

## The Trading Center of the Motor Car Industry

Get busy at once—begin advertisement NOW and continue it through the Show Numbers—the Big One of January 30, and the Commercial Car Issue of February 6.

You can't help but get **BIG RESULTS** from advertising in MOTOR AGE at this time of year.



**Practical Gas Engineer** Twelve years' constant experience with Hydro-Car-B by E. W. LONGNECKER on Engines. How to start, how to operate, and how to care for all classes of explosive motors or engines using gas, gasoline or similar fuels. A full and exhaustive chapter on electric and other systems of igniting. Every line tells something. Every page full of interest. A book of 172 pages, **THE CLASS JOURNAL CO.** neatly bound in cloth. Sent postpaid on receipt of price, \$1.00. 910 S. Michigan Avenue, Chicago

When Writing to Advertisers, Please Mention Motor Age.





**THE WORLD'S STANDARD**

for

**ELECTRIC LIGHTING AND  
STARTING SYSTEMS**

as well as for

**IGNITION PURPOSES**

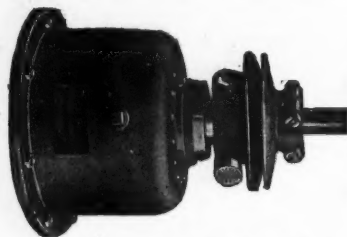
**IS NOW UNANIMOUSLY ADOPTED BY THOSE  
WHO HAVE "TRIED THEM ALL OUT."**

Ask for new 2-color circular describing 27 different  
kinds

**COMPLETE STOCK FOR IMMEDIATE SHIP-  
MENT. OUR WIRE AWAITS YOUR WIRE.**

**ABSOLUTE SATISFACTION GUARANTEED**

**THE PACKARD ELECTRIC COMPANY**  
306 Dana Avenue Warren, Ohio



The  
Most Perfect  
**CLUTCH**  
in the World

THE **EVANS** MODEL

**HELE-SHAW CLUTCH**

*Used on over 100,000 trucks and pleasure  
cars of over 250 makes*

The Hele-Shaw is the only clutch that can be made  
with wedge shaped annular grooved plates, combin-  
ing the best of the cone and disc principles.

Has a grip like a vise but is slippable indefinitely,  
giving a capability of speed ranging from a creep  
to full power.

The Hele-Shaw Clutch reduces tire and mechanical  
repair bills. Insures perfect control and full engine  
efficiency. Increases safety and comfort. Eliminates  
the jerk.

*Every car or truck driver should know the clutch subject, but  
few do. Write today for our Clutch Treatise No. 30. It's free*

SEE US AT THE CHICAGO SHOW

**MERCHANT & EVANS CO.**

*The Premier Metal House in America*

**PHILADELPHIA**

New York Brooklyn Chicago Kansas City  
Baltimore Wheeling Cleveland Denver



## Index to Advertisements

### A

Abbott Motor Co. .... 106  
Acheson Graphite Co., Inter-  
national ..... 107  
Aermore Mfg. Co. .... 93  
Alrease Tire Filler Co. .... 62-63  
Ajax-Grieb Rubber Co. .... 99  
American Ball Bearing Co. .... 77  
American Motors Co. .... 100  
Ames Motor Car Co. .... 103  
Atlas Auto Supply Co. .... 93  
Atwater Kent Mfg. Works. .... 67  
Auburn Automobile Co. .... 88  
Auto Lock & Specialty Co. .... 98  
Automobile Equipment Co. .... 99  
Automobile Supply Mfg. Co. .... 90

### B

Badger Brass Mfg. Co. .... 107  
Baker Motor-Vehicle Co. .... 96  
Barthel, Daly & Miller. .... 90  
Bartholomew Co. .... 80  
Beaver Mfg. Co. .... 102  
Beckley-Ralston Co. .... 104  
Borland-Grannis Co. .... 102  
Bosch Magneto Co. .... 102  
Bowser, S. F., & Co. .... 103  
Braender Rubber & Tire Co. .... 87  
Bremer-Wilson Mfg. Co. .... 81  
Brennan Motor Mfg. Co. .... 91  
Bretz, J. S., Co. .... 100  
Brietson Mfg. Co. .... 88  
Bridgeport Brass Co. .... 105  
Brown Co. .... 87  
Buckeye Mfg. Co. .... 102  
Buda Co. .... 95  
Buffalo Electric Vehicle Co. .... 86  
Buob & Scheu. .... 107  
Byrne, Kingston & Co. .... 90

### C

Cartercar Co. .... 94  
Central Brass & Fixture Co. .... 115  
Central West Supply Co. .... 84  
Chase Motor Truck Co. .... 92  
Chicago Automobile Supply  
House ..... 106  
Chicago Electric Motor Car Co. 93  
Classified .....  
..... 108, 109, 110, 111, 112, 113  
Cleveland-Canton Spring Co. .... 88  
Cole Motor Car Co. .... 90  
Connecticut Shock Absorber Co. 92  
Continental Motor Mfg. Co. .... 106  
Corcoran Lamp Co. .... 95  
Covert Motor Vehicle Co. .... 95  
Croton Motor Car Co. .... 92  
Cullman Wheel Co. .... 107  
Cutting Motor Car Co. .... 100

### D

Dart Motor Mfg. Co. .... 98  
Dean Electric Co. .... 93  
Diamond Specialty Co. .... 82  
Diamond Rubber Co. of N. Y. .... 103  
Dixon, Joseph, Crucible Co. .... 98  
Dorris Motor Car Co. .... 95  
Double Fabric Tire Co. .... 102

### E

Eagle Oil & Supply Co. .... 97  
Eisemann Magneto Co. .... 100  
Empire Automobile Co. .... 101  
Enger Motor Car Co. .... 91

### F

F. I. A. T. .... 104  
Firestone Tire & Rubber Co. .... 100  
Ford Motor Co. .... 101  
Franklin Automobile Co. .... 92  
Frontier Specialty Co. .... 106

### G

Gabriel Horn Mfg. Co. .... 79  
General Electric Co. .... 107  
Gibney, James L., & Bro. .... 105  
Gilbert Mfg. Co. .... 105  
Golde-Patent Mfg. Co. .... 97  
Goodrich, B. F., & Co. .... 106  
Goodyear Tire & Rubber Co. .... 90  
Gramm-Bernstein Co. .... 99  
Grand Rapids Motor Truck Co. 103  
Gray & Davis. .... 94  
Great Western Automobile Co. 94  
Greenslade Oil Co. .... 106  
Grossman, Emil, Co. .... 91  
Guide Motor Lamp Mfg. Co. .... 88

### H

Halliwel Co. .... 97  
Ham, C. T., Mfg. Co. .... 94  
Hartford Machine Screw Co. .... 79  
Hartford Suspension Co. .... 2  
Hayes Mfg. Co. .... Cover  
Haynes Automobile Co. .... 93  
Haywood Tire & Equipment Co. 88  
Heinze Electric Co. .... 106  
Henderson Motor Car Co. .... 95  
Herreshoff Motor Co. .... 90  
Herz & Co. .... 84  
Hoffecker Co. .... 100  
Holley Bros. Co. .... 59  
Hotel La Salle. .... 81  
Hotel Sherman ..... 107  
Hotel Woodstock ..... 98  
Houk, Geo. W., Co. .... 94  
Hoyt Electrical Instrument  
Works ..... 85  
Hupp Motor Car Co. .... 99  
Hyatt Roller Bearing Co. .... 98

### I

Ideal Motor Car Co. .... 93  
Ideal Steel Wheel Co. .... 92  
Imperial Automobile Co. .... 101  
Independence Motors Co. .... 106  
Ingersoll-Rand Co. .... 88  
Inner Shoe Tire Co. .... 107  
Inter-State Automobile Co. .... 98

### J

Jackson Automobile Co. .... 97  
Jeffery-Dewitt Co. .... 72  
Jenkins Mfg. Co. .... 104  
Jiffy Auto Curtain Co. .... 92  
Johns, H. W., Manville Co. .... 83-85  
Johnson Service Co. .... 85  
Jones Speedometer, The. .... 84

### K

K-W Ignition Co. .... 86  
Keeton Motor Co. .... 92  
Kellogg Mfg. Co. .... 101  
Kellom, Chas. F., & Co. .... 101  
Kimball Tire Case Co. .... 99  
Kinsey Mfg. Co. .... 101  
Kissel Motor Car Co. .... 96  
Kline Motor Car Corp. .... Cover  
Knox Automobile Co. .... 89

When Writing to Advertisers, Please Mention Motor Age.

# Index to Advertisements

<b>L</b>	
Lauth-Juergens Motor Car Co..	97
Lippard-Stewart Motor Car Co.	71
Lobee Pump & Machinery Co.	106
Long Mfg. Co.	91
Lovell-McConnell Mfg. Co.	55
Lozier Motor Car Co.	Front cover
<b>M</b>	
McCue Co.	101
McFarlan Motor Car Co.	91
McGraw Tire & Rubber Co.	96
McIntyre, W. H., Co.	97
Marathon Motor Works.	86
Marburg Bros., Inc.	105
Marion Motor Car Co.	83
Mayer Carburetor Co.	90
Mayo Mfg. Co.	99
Mercer Automobile Co.	94
Merchant & Evans Co.	114
Metz Co.	95
Michener, E. S.	102
Michigan Motor Car Co.	86
Miles, S. A.	76
Model Gas Engine Works.	105
Moline Automobile Co.	75
Mosler, A. R., & Co.	81
Motometer Co.	83
Motor Car Equipment Co.	99
Motor Car Mfg. Co.	106
Motor Car Supply Co.	106
Motz Tire & Rubber Co.	106
Myers Auto Top Co.	96
<b>N</b>	
National Motor Supply Co.	104
National Motor Vehicle Co.	56
New Departure Mfg. Co.	78
New York & New Jersey Lubri- cant Co.	96
Nordyke & Marmon Co.	103
Norwalk Motor Car Co.	96
Nyberg Automobile Works.	103
<b>O</b>	
Oakes Co.	107
Oakland Motor Car Co.	90
Owen, R. M., & Co.	98
<b>P</b>	
Packard Electric Co.	114
Packard Motor Car Co.	102
Paige-Detroit Motor Car Co.	93
Palmer & Singer Mfg. Co.	1
Peacock, Clarence N.	101
Pennsylvania Rubber Co.	97
Perfection Spring Co.	107
Piel, G., Co.	107
Pilot Car Sales Co.	97
Pittsfield Spark Coil Co.	105
Premier Motor Mfg. Co.	87
Prest-O-Lite Co.	78
Prosser, Thos., & Son.	104
Pullman Motor Car Co.	89
<b>R</b>	
R. I. V. Co.	115
Rayfield Carburetor Co.	102
Remy Electric Co.	83
Republic Rubber Co.	103
Rhineland Machine Works Co.	104
Royal Equipment Co.	95
Rub-On Mfg. Co.	81
Rushmore Dynamo Works.	100
Rutenber Motor Co.	91
<b>S</b>	
Salisbury Wheel & Mfg. Co.	94
Sanford Motor Truck Co.	95
Schacht Motor Car Co.	98
Schrader's, A., Sons.	87
Scott, Semple S.	103
Searchlight Gas Co.	88
Selden Motor Vehicle Co.	100
Shaler, C. A., Co.	89
Shawmut Tire Co.	104
Sheldon Axle Co.	70
Spacke, F. W., Machine Co.	82
Sparks-Withington Co.	96
Speedwell Motor Car Co.	87
Spicer Mfg. Co.	68
Splitdorf Electrical Co.	91
Standard Oil Co.	104
Standard Welding Co.	89
Standard Woven Fabric Co.	94
Star Ball Retainer Co.	93
Staver Carriage Co.	92
Steam Carriage Boiler Co.	107
Stearns Co., F. B.	89
Stevens-Duryea Co.	99
Stewart-Warner Speedometer Corp.	64-69
Stromberg Motor Devices Co.	53
Studebaker Corporation	96
Sturdy Mfg. Co.	106
Suspension Roller Bearing Co.	89
Swinehart Tire & Rubber Co.	89
<b>T</b>	
Thurber Rotary Starter Co.	65
Times Square Auto Co.	89
Timken Roller Bearing Co.	73
Tuthill Spring Co.	104
Twentieth Century Tire Pro- tector Co.	88
Twitchell Gauge Co.	87
<b>U</b>	
United States Light & Heating Co.	105
United States Tire Co.	60-61, 116
United Steel Co.	82
<b>V</b>	
Vacuum Oil Co.	105
Veeder Mfg. Co.	85
<b>W</b>	
Ward, Leonard, Electric Co.	74
Warner Gear Co.	84
Warner Mfg. Co.	80
Waverley Co.	Back cover
Weed Chain Tire Grip Co.	3
Wells, R. C., Mfg. Co.	58
Weston Electrical Inst. Co.	86
Weston-Mott Co.	104
Wheeler & Schebler.	54
White Co., The.	4
Whitney Mfg. Co.	Cover
Willard Storage Battery Co.	57
Willys-Overland Co.	68
Winton Motor Co.	91
<b>Z</b>	
Zenith Carburetor Co.	86



**EXHAUSTIVE  
TESTS  
HAVE PROVED  
THEM BEST**

R. I. V. Ball Bearings have correctly grooved raceways, eliminating excessive side-play, machine-cut ball retainers and consequent uniform accuracy of spacing.

Designed after a most careful investigation into the requirements of automobile service. Leading manufacturers, after making exhaustive tests of all anti-friction bearings, are placing them on their latest output.

R. I. V. success rests in the confidence of the public in its product, its methods and its business integrity.

**R. I. V. COMPANY**

Imported  
Since 1904

1771 Broadway  
New York City

## THE REASON The BUCKEYE SURE-STARTER Saves 25% of your gasoline

**NO** more churning and grinding until your back is lame trying to start your car. Just prime your motor with a "Buckeye Sure Starter." Then one turn of the crank—and you are off.

Shifting the air control lever to the right admits to the manifold a "just right" amount of air for a mixture of highest efficiency and guarantees you a 25% increase of power and a 25% saving of gasoline. Carbonization is effectively prevented by feeding kerosene to the cylinders through the "Sure Starter" once a week.

The "Sure Starter" will soon pay for itself in fuel economy alone.

Price is within the reach of every motorist.

Anyone can readily attach in one hour's time.

Price complete:  
Brass \$9.50  
Nickel Plated \$10

**ABSOLUTELY GUARANTEED OR MONEY REFUNDED  
AT ALL DEALERS OR DIRECT ON RECEIPT OF PRICE**

*Write for further information*

Competent, wide-awake dealers wanted everywhere!

**The Central Brass & Fixture Company**  
Dept. M, Springfield, Ohio

When Writing to Advertisers, Please Mention Motor Age.



# The UNITED STATES DUNLOP (Straight side) TIRE

is the premier automobile  
tire of the world

## The Genuine Dunlop Tire

represents what thousands of motorists regard as the ideal *type* of tire.  
It is in no sense a *new* tire.

The Hartford Rubber Works practically introduced it into this country more than ten years ago, and it has always been one of the standard Hartford (now United States) tires.

No other tire has ever been imitated so widely as has this tire, and yet in no other tire has the *original principle* been so firmly adhered to.

The illustration on this page is of the original Dunlop tire, stripped of any and all the so-called "improvements" which some of the Dunlops have shown.

As an indication of the growth in favor which this *genuine* Dunlop has enjoyed, it may be stated that the United States Tire Company has, without the blare of trumpets, actually taken care of

### MORE THAN A 600% INCREASE IN SALES IN LESS THAN A YEAR'S TIME

So insistent has the demand become for this tire (in the face of the most strenuous competition on the part of other tires of a similar type) that we have been obliged to add immensely increased facilities for its manufacture during 1913.

From now on the United States Tire Company will undertake to supply all the *genuine* Dunlop tires demanded by the trade.

Bear in mind—this Dunlop is the *only* Dunlop possessing *all* the merits of this extraordinary tire.

UNITED STATES  
TIRE COMPANY

Easiest  
Tire on the  
market to  
put on or  
take off.  
Fits any  
Q. D. rim.

Easiest  
Tire on the  
market to  
put on or  
take off.  
Fits any  
Q. D. rim.

## Cannot Rim-cut, of Course

When Writing to Advertisers, Please Mention Motor Age.



**W**E CALL your attention here to "Whitney" Cotter Detachable Chains as the most practical chains ever offered for motor vehicles. They have made a record for themselves which no other Detachable Type has approached.

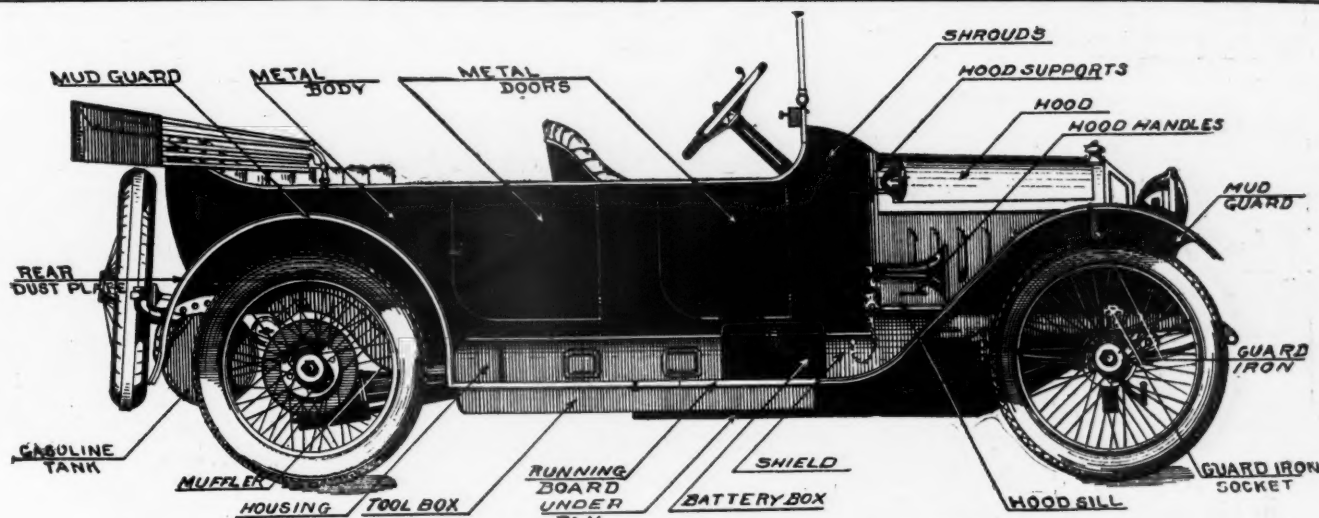
This Cotter Pin feature is so practical and necessary that it calls for little detailed explanation. The illustrations tell their own story, proving that this form of construction is logical and necessary for chain equipped motor vehicles. This Cotter Detachable Chain can be taken apart at any link and lengthened, shortened or repaired without the use of any special tool as the Cotter Pin can be removed with pliers, screw driver or any sharp pointed instrument. The use of Whitney Cotter Detachable Chains assures the builder, owner and driver of commercial vehicles uninterrupted service on account of the ease of repair.

Whitney Chains are made from steel best adapted for the purpose, carefully hardened and calculated to resist the most wear, while in the matters of machining and assembling the utmost care is exercised and thorough inspections and tests characterize each process of manufacture. Their future service, however, depends upon the accuracy of sprockets, care, lubrication, alignment and adjustment, for the best chain in existence cannot withstand the evil influence of improper conditions and give best results.

Write for our illustrated catalog, which shows top and side views of each size of all Roller chains manufactured by us.

*"Whitney" Chains are Built for Strains*

**The Whitney Mfg. Co., Hartford, Conn.**



The new Edwards-Knight, designed by the Edwards Motor Car Company

## Designers and Manufacturers of Automobiles

find in the Hayes organization a way to greater accuracy; to greater speed; to greater economy. Hayes engineers are specialists; the Hayes factories are abreast of every demand; and Hayes bodies in beauty of workmanship add the decisive touch of distinction to an automobile.

The Hayes organization is at your service. Twenty vital parts of an automobile it turns out complete—the twenty parts illustrated in this diagram. In these twenty parts is practically all the beauty of the car. Is it not worth your while to investigate?

Hayes Boxes are found on one car out of every three. They are as secure as they are handsome—and come in twenty-six standard sizes to fit any running board. Every box bears the Hayes trade mark—the brand of quality. Remember, Hayes for boxes and bodies.

**HAYES MANUFACTURING COMPANY, Detroit, Michigan**

**LARGEST USERS OF SHEET METAL IN THE WORLD**



# Waverley

## THE SILENT ELECTRIC



LIMOUSINE-FOUR PRICE \$2,900

Four  
Separate  
Pullman  
Chairs.  
Three  
Facing  
Forward

Full View  
Ahead,  
Driven  
From the  
Left  
Hand  
Rear Seat



INTERIOR

LIMOUSINE-FOUR



## How Waverley Experience and Factory Facilities Evolved the Limousine-Four



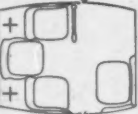
Here is the latest triumph of a company which has originated practically every improvement in electric vehicle construction.

That has factory equipment for the manufacture of every type of electric vehicle, from the smallest runabout or brougham to a mighty five-ton truck—

—And whose experience, gained in the making of this unlimited range of electrics, enabled them to evolve this most elegant, comfortable, and convenient of all four passenger electrics.

Without such experience, and the knowledge gained thereby, such an achievement would hardly have been possible.

It took the company who built the first coupe electric—the first electric with the high efficiency shaft drive—the first electric which could take either solid or pneumatic tires—the first electric with full elliptic springs and patented drop sill construction—and the first five passenger full view ahead electric to originate and design.



Patents Pending

## The Silent Waverley Limousine-Four

In this wonderful car four separate Pullman chairs replace the usual forward and backward seats. Three face forward, the fourth is a "cozy corner" in front at the right.

Thus affording full four passenger capacity without obstructing the view of the driver, who sits as usual in the left hand rear seat—the pleasant and sociable position—with instead of in front of the other occupants of your car, as shown by the diagram.

Waverley patented drop sill construction permits of a beautiful, graceful low-hung body swung on full elliptic springs—a combination which insures easy riding over every road and with any tires while saving current, increasing mileage and protecting your car from racking bumps and jars.

The Limousine-Four will be on exhibition at the leading automobile shows, where both dealers and prospective electric car owners can personally judge of its perfection—

—and decide if such a splendid car, the last word in four passenger electrics, could have been designed and perfected except by past masters of electric vehicle construction—men who from long experience know the mechanical requirements of every type, from the most luxurious pleasure car to the massive delivery truck.

Let us send you the Silent Waverley Electric Year Book which illustrates and describes the Limousine-Four, the famous Limousine-Five and the other Waverley pleasure car models illustrated in the left hand panel.

A beautiful production with decorations by a famous artist—it is yours on request together with the Waverley Commercial Car Catalog, showing types ranging from a light delivery wagon to a 5-ton truck. Address

**THE WAVERLEY COMPANY**  
209 South East Street Indianapolis, Indiana

Chicago Branch, 2425 Michigan Avenue  
New York Branch, 1784 Broadway



LIMOUSINE-FIVE  
PRICE \$3,500



GEORGIAN BROUGHAM  
PRICE \$3,250



EMPIRE BROUGHAM  
PRICE \$2,800



COLONIAL BROUGHAM  
PRICE \$2,375



SHELTERED ROADSTER  
PRICE \$2,250



1000 LB DELIVERY  
PRICE \$2,000



ONE TON TRUCK  
PRICE \$2,500



TWO TON TRUCK  
PRICE \$3,250



THREE & ONE HALF TON TRUCK  
PRICE \$3,750



FIVE TON TRUCK  
PRICE \$4,500